



LOWER TANA RIVER

DISTRICT ENVIRONMENTAL
ASSESSMENT REPORT

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Environmental Training and Management
in Africa Project (ETMA)
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United States Agency for International Development,
Southeast Consortium for International Development (SECID), and
Clark University

SEPTEMBER 1985

F O R E W O R D

This Environmental Assessment report for Lower Tana River is the result of collaborative effort between the National Environment Secretariat (NES) of the Ministry of Environment and Natural Resources of the Government of Kenya, and the International Development Programme of Clark University and the Southeast Consortium for International Development. This project on District Environmental Assessment was initiated in 1978 with the principal objective of finding ways of incorporating environmental considerations into the process of district planning and decision-making. Funding has come from the Kenya Government and the United States Agency for International Development. The project itself derives its motivation from a number of considerations, chief among them being:-

- (i) that it is a facet of Government policy to bring environmental factors into the mainstream of Government policy-making in order to optimise use of scarce resources for the overall national good;
- (ii) that the Government has recognised the district as the primary unit of planning in order to effectively bridge the gap between the grassroots and higher policy-making levels. To this end, the Government has established district development committees to decentralise decision-making and policy administration;
- (iii) that incorporation of environmental considerations at the planning stages of any project or programme would help avoid the costly correction of environmental degradation that would otherwise ensue. This makes clear the need to ensure the integration of development planning and environmental management objectives at the district level.

This report is part of the environmental assessment of the Coastal Zone which covered the other coastal districts in their entirety i.e. Kwale, Mombasa, Kilifi and Lamu. Since most of Tana River is not really coastal, the area of study was confined to the area enclosed by joining the Kilifi and Lamu District boundaries. It is hoped that the rest of the district will be assessed soon to enable compilation of a district report.

Thus this report, parallel to others in the series, is geared toward making a contribution to the implementation and future formulation of the District Development Plan for Tana River District. Its aim is that the development of the

district takes place without the destruction of the resource base upon which it depends so as to ensure a sustained and enhanced quality of life for the people of Tana River. To this end, the report is complementary not only to others in the series but also to other parallel exercises being undertaken by the NES at Provincial and National levels.

The basic framework of the project itself is derived directly from the Guidelines for Environmental Management (GEM) developed by UNEP and tailored to meet the specific requirements of the district exercise. It is hoped, therefore, that the recommendations contained in this report will form a truly useful basis for the management of the environment of Tana River District in the dynamic context of the development of the district.

I would like sincerely to thank all those persons who made contributions to the success of this exercise including the following: The Government Ministries based in Nairobi for basic information and data; the Kenya Marine and Fisheries Research Institute for their support and for covering the Marine Resources section of the report; the District Commissioner for his keen interest and support during fieldwork; the Departmental Heads for information and data; the District Officer for Southern Division and his Divisional staff for valuable information and data and for organising the site visits; the Chief of Tarassa for interviews and site visits, Mr. John Bore of the Lower Tana Village Irrigation Programme for site visits and research materials; the Range Management Officer and Fish Scouts for site visits; the people of Lower Tana River who provided insights which helped attune the report to the realities of the area; the Forest Department for preparation of base maps; Miss E. Kariuki and Mrs. E. Wachira for typing the draft report; and finally the multidisciplinary NES and KM & FRI team whose contributions helped make this report possible. The team which carried out the research and preparation of this report included:-

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It is my sincere hope that the work and co-operative spirit shown by the above groups will be sustained during the more important phase of the implementation of the recommendations and findings contained in this report.

(DR. R. KAMAU)
DIRECTOR

NATIONAL ENVIRONMENT SECRETARIAT

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PART I:

INTRODUCTION

1.0

OVERVIEW OF THE NATURAL ENVIRONMENT

1.1

LOCATION OF LOWER TANA RIVER

Tana River District borders Garissa, Isiolo and Meru Districts to the north, Kitui District to the west; Taita Taveta and Kilifi Districts to the south; and Lamu District and the Indian Ocean to the east. (Fig 1.) The district is divided into four administrative divisions i.e. Garsen, Galole, Bura and Madogo. The divisions are further subdivided into seventeen locations (Fig. 2). The study area covers Chara and Ngao locations, and parts of Bilisa and Salama locations around Garsen Town.

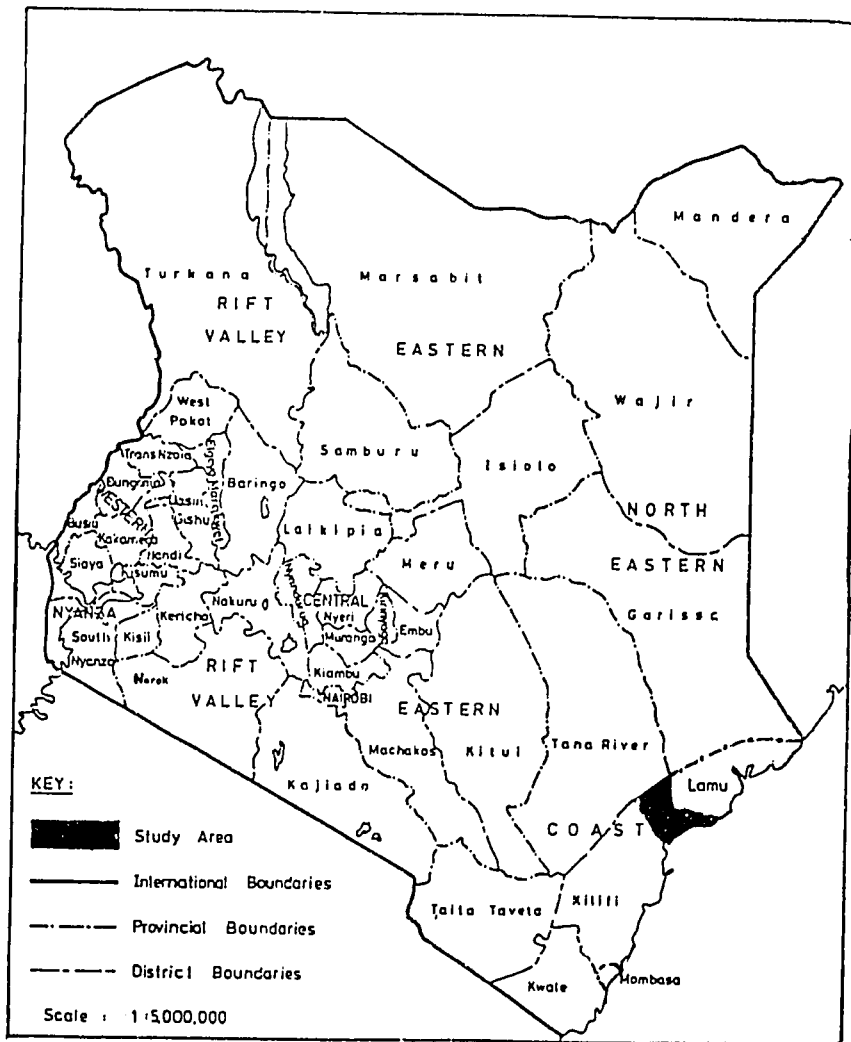


FIGURE 1: LOCATION MAP

1.2

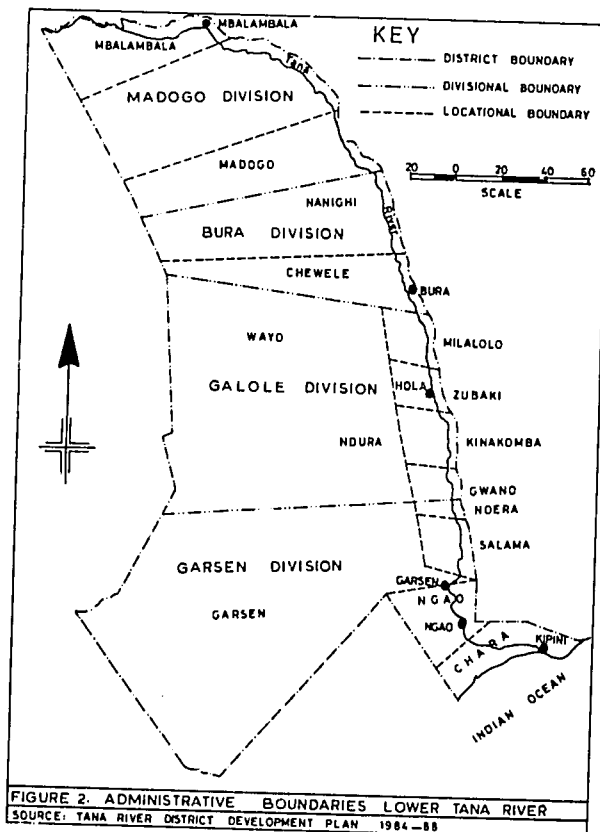
TERRAIN, GEOLOGY AND SOILS

1.2.1 TERRAIN

The study area is generally flat with two well-marked physiographic features: the Tana River Basin on the eastern part and the Nyika Plateau to the west with an average altitude of 200m. Laga Buna acts as tributary to the river during the rainy season while lakes Shakabobo and Balisa receive their waters from the Tana River when it overflows its banks. The river flows into the ocean through a marshy delta.

1.2.2 GEOLOGY

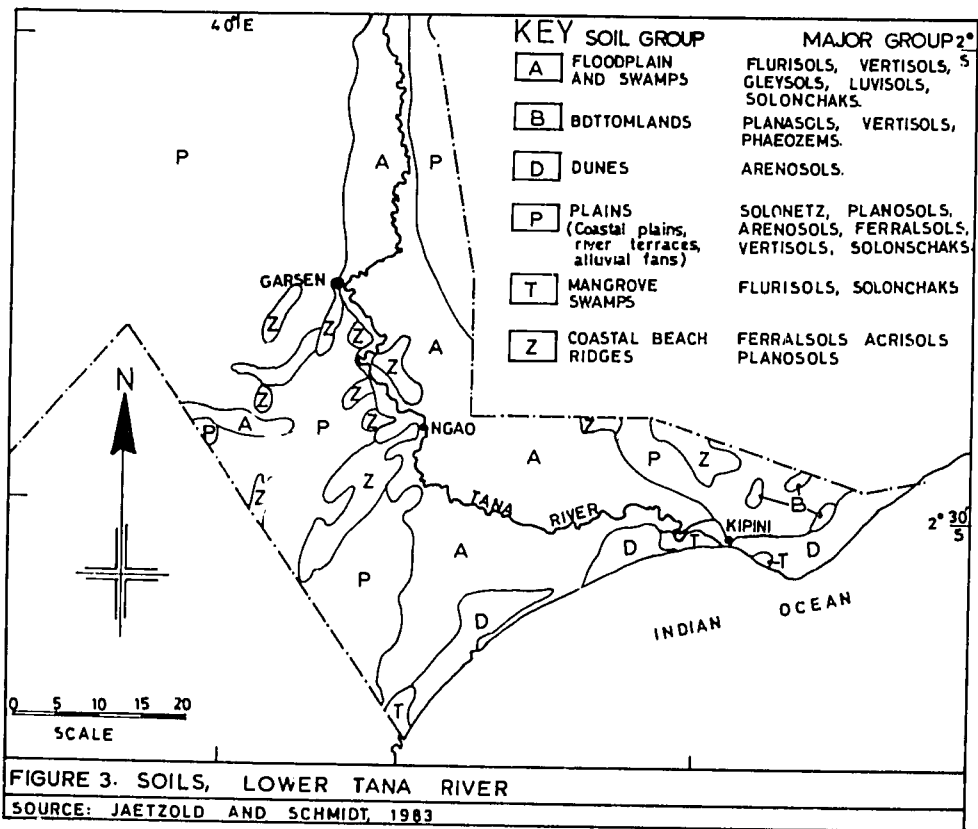
The whole study area is underlain by the old basement rocks. To the north and northwest the basement rocks are overlain by sedimentary rocks which make up the upper river terraces and large alluvial fans. The coastal zone consists of beach ridges and coral rocks.



1.2.3 SOILS

The soils within Lower Tana River area are generally deep but vary in drainage from poorly drained to well drained depending on local topography. The soils can be grouped into six major units depending on how they were formed (Fig 3). These are soils developed on:

- (i) flood plains and swamps,
- (ii) bottomlands,
- (iii) sand dunes,
- (iv) plains,
- (v) mangrove swamps, and
- (vi) coastal beach ridges.



(i) Soils developed on Flood plains and swamps

The soils have developed on sediments from various sources. They consist of flurisol, vertisols, gleysols, luvisols and solonchaks. They are found along the Tana River flood plain which widens towards the delta.

(ii) Soils developed on Bottomlands

These soils have developed on infill from lagoonal deposits. They consist of planosols, vertisols and phaeozems.

(iii) Soils developed on sand dunes

The soils, consisting mainly of arenosols, are excessively drained. They are found along the coast, broken only by the river's distributaries.

(iv) Soils developed on plains

These are the most extensive soils covering the coastal plains, river terraces and alluvial fans. They consist of solonetz, planosols, arenosols, ferralsols, vertisols and solonchaks.

(v) Soils within Mangrove swamps

These are found along the coast at the mouths of rivers. They are composed of poorly drained fluvisols and solonchaks.

(vi) Soils on coastal beach ridges

These have developed on coastal beach ridges. They consist of well-drained, ferralsols, acrisols and planosols.

1.2.4 IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

The swamps, waterlogged and flood-prone areas of the flood plain provide breeding grounds for mosquitoes.

The sandy soils have high infiltration rates which lower the effectiveness of rainfall.

While the broad patterns of soils are easy to establish, the local variability in fertility is high (see section 2.3).

1.3

CLIMATE AND WATER

1.3.1 CLIMATIC CONDITIONS

The monsoonal air currents of the Indian Ocean, coupled with the convectional currents over the hot, dry hinterland immediately to the west, largely control the weather of the Kenya Coast. Due to Kenya's position across the equator, the region is mostly sunny and warm, experiencing only slight variations in temperature during the year. The moist southeast monsoon and relatively dry northeast monsoon, in conjunction with the Inter-tropical Convergence Zone (ITCZ), dictate the rainfall pattern of the region. In January the sun is over the Tropic of Capricorn and the ITCZ is centred in Zimbabwe. Thus wind blowing over the Kenya Coast during November to March is dry and northeasterly (Fig 4 A). In July the sun is over the Tropic of Cancer and the ITCZ is centred in Sudan. The wind blowing over the region during May to October is southerly or southeasterly (Fig 4B). Most rainfall occurs in the months between the monsoons, when convection is enhanced.

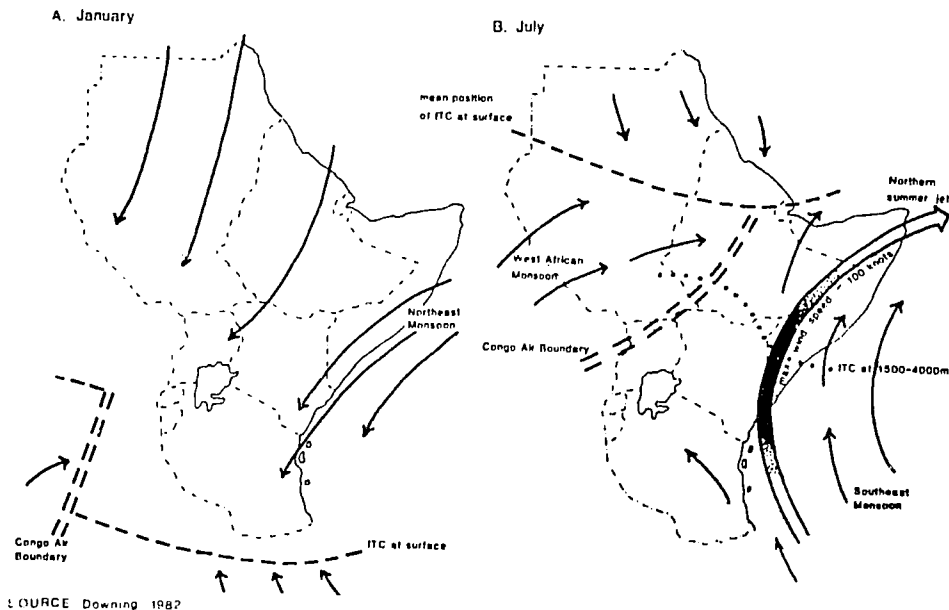


FIGURE 4. REGIONAL CIRCULATION PATTERNS IN JANUARY AND JULY

The north/south shift of the ITCZ is responsible for a bimodal rainfall pattern, characterised by long rains during March-May and short rains in October-November. The year starts dry and remains so until March when rainfall increases. A fairly rapid increase occurs through April and builds up to a maximum of rainfall in May. Then rainfall decreases steadily but significant amounts are still recorded in October and November. During December a decrease is registered that leads to the rainfall minimum in January and February. The climatic potential of the region is difficult to define accurately due to lack of rainfall recording stations. Nevertheless, rainfall records from Kipini, Karawa and Ngao give a fair indication of climatic patterns of the region (Fig. 5).

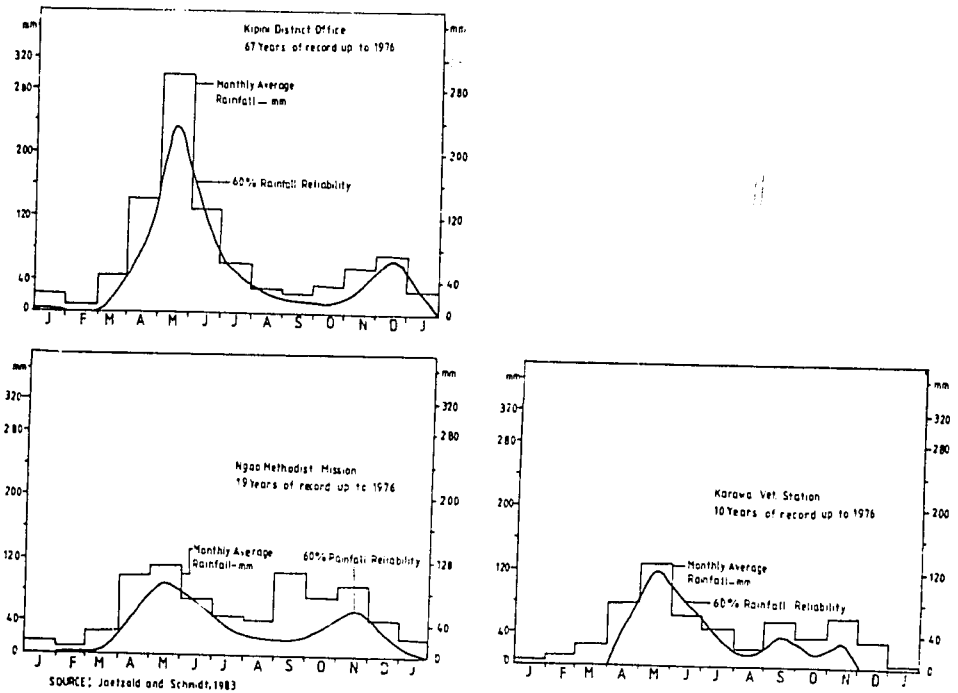
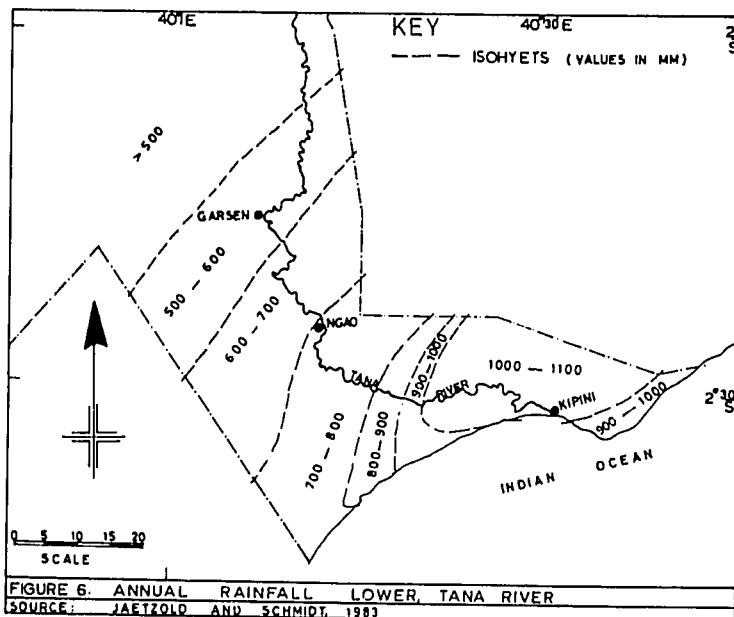


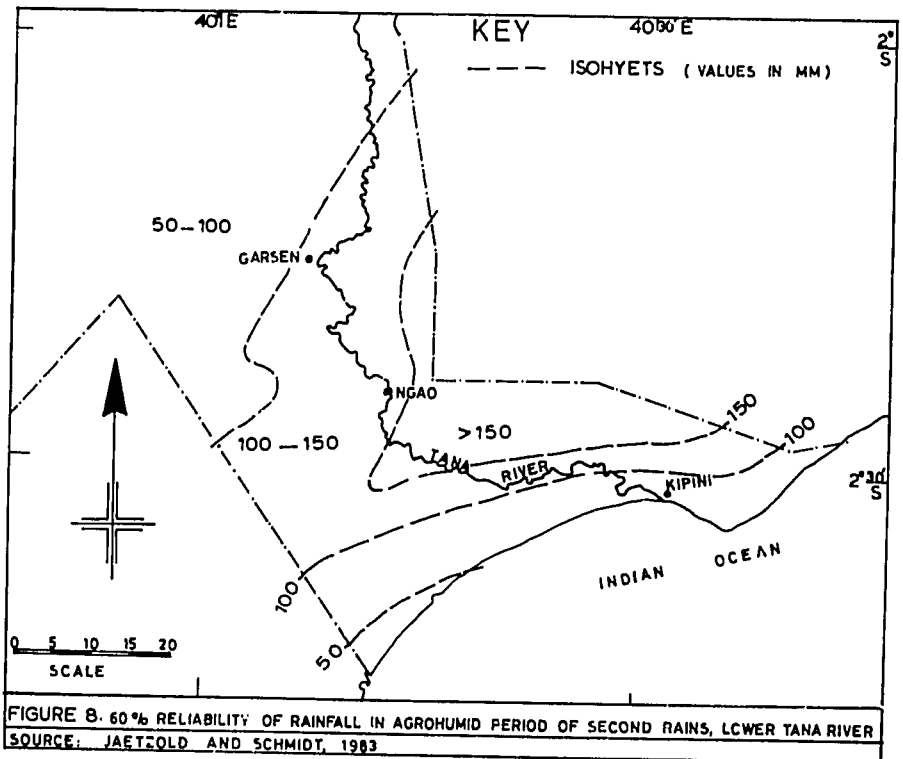
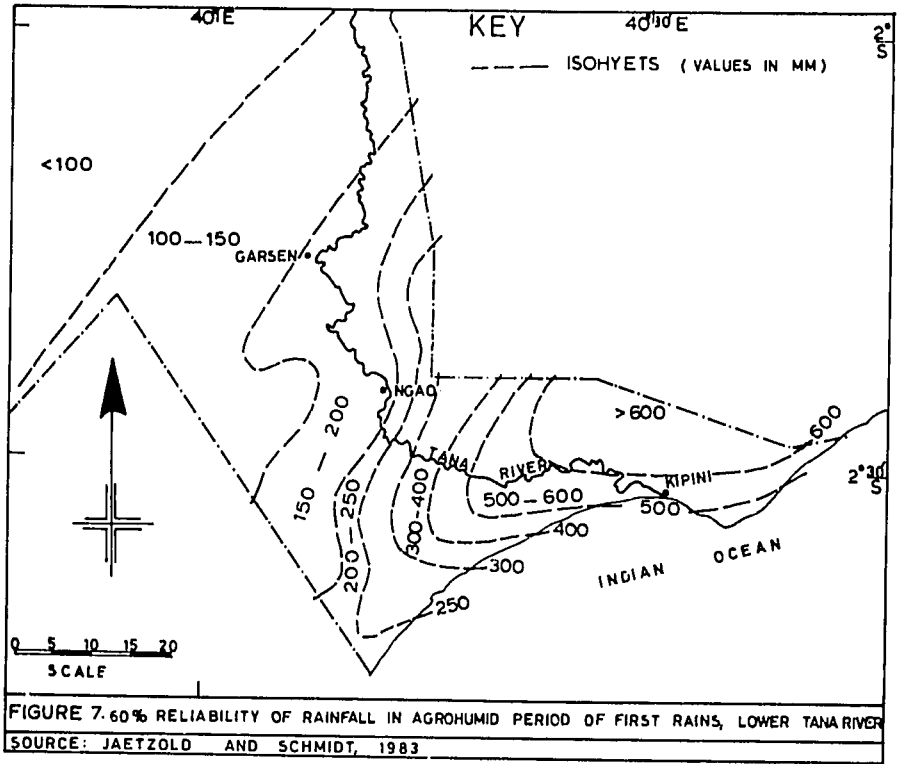
FIGURE 5. RAINFALL DISTRIBUTION, LOWER TANA RIVER

The region has a mean annual rainfall of 480 mm. However, there is a higher rainfall area near the Coast to the east adjoining Lamu District. There are three rainfall zones with the rainfall decreasing toward the western and north-western parts of the region. (Fig. 6). The seasonal rainfall of the three zones is discussed below (Fig. 7 and 8).

Adjoining Lamu District is the zone with the highest average annual rainfall of between 1000 - 1100 mm. During the first rains, this zone is likely to receive 630 - 660 mm of rain, and 150 - 160 mm during the second rains. The growing period is 135 - 155 days in the first rains and 40 - 55 days in the second rains giving a total of 175 - 210 growing days in a year. The temperatures in this zone are high with the annual mean temperature ranging between 26.6° and 26.5°C. (Figs. 7 and 8).

Along the coastal area to the south and to the west of the first zone is another rainfall zone with an annual average rainfall of 900 - 1000mm. This zone is likely to receive 560 - 630 mm of rainfall and 100 - 160 mm in the first rains and second rains respectively. The growing period is 115 - 135 days in the first rains and 40 - 55 days in the second rains; a total of 155 - 190 days in a year. Annual mean temperature ranges between 26.7°C and 26.3°C. (Figs. 7 and 8).





This zone is bordered to the west by another rainfall zone with an annual average rainfall of between 740 and 900mm. In the first rains the zone receives between 220 and 450 mm and 50 - 90mm in the second rains. The growing period ranges between 75 - 85 days for the drought resistant crops. Rainfall in this zone is unreliable and total growing days in a year are between 95 and 130. Temperatures range between 27.0°C and 26.3°C.

1.3.2 WATER RESOURCES

The Lower Tana River region, like the rest of the district, lacks adequate surface water for both human and animal consumption. Tana River is the major source of water. There is abundant water flowing along the river into the Indian Ocean particularly after heavy rains upcountry. Lagas form seasonal rivers and ponds appear during rainy seasons. Some of these stay a few months after the rains. This means that the animals go for days without water especially during the dry seasons. The Tana Delta has several tributaries which make the area marshy.

A number of dams have been built in the upper catchment area of the Tana River for production of hydro-electric power, and to regulate the flow of the river for power generation and irrigation schemes downstream. As more dams are built, they will have considerable effect on the discharge downstream, virtually suppressing the usual annual floods and may substantially reduce the flood intervals.

Although the water from Tana River is brownish due to soil erosion upcountry, it is used for human as well as livestock consumption. People living away from the river walk long distances in order to draw water from it. The two major water schemes in the area - the Garsen water supply and the Ngao Tarassa water supply - draw water from the river but the quantity is inadequate. In areas further away from the river, underground water from wells is the major source of water. However, most of the ground water is saline.

1.3.3 IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

The heavy rains experienced in the area coupled with the flat topography cause prolonged wetness and render access roads impassable. Floods occur regularly and, although they replenish soil fertility through deposition of silt, they cause destruction of crops.

The importance of the water resources of the lower Tana River area are:

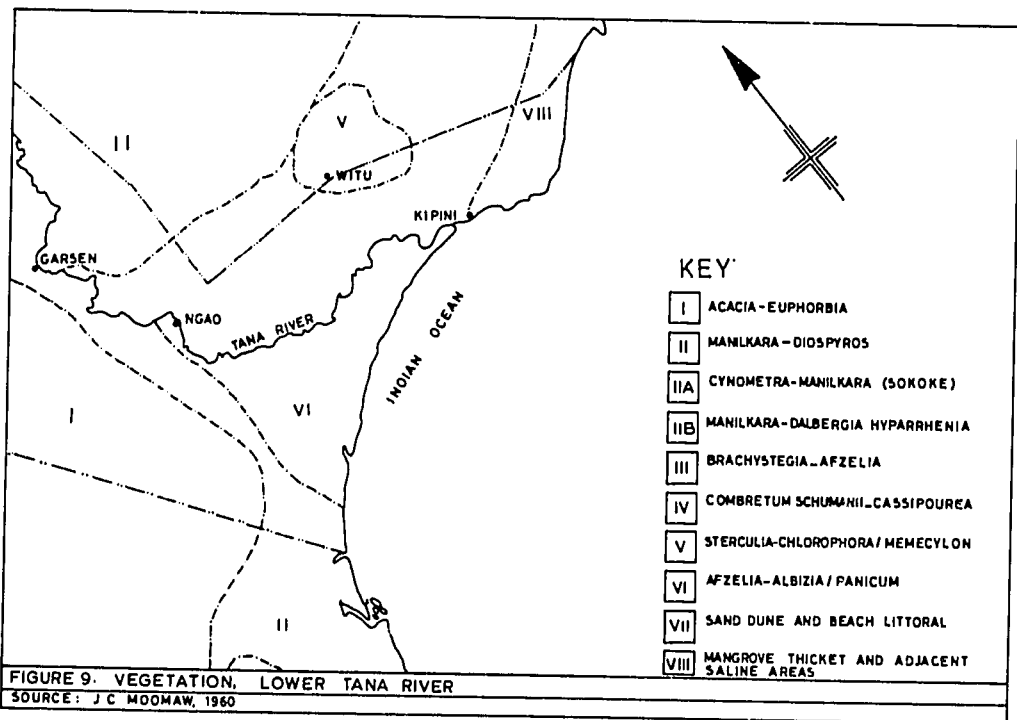
- (a) High agricultural potential is limited to areas along the river basin and to the wetter eastern side adjoining Lamu District.
- (b) Tana River remains the main source of water and can be utilised to provide water for:-
 - (i) human use,
 - (ii) livestock and wild game,
 - (iii) irrigation, and
 - (iv) development of hatcheries for fish farming.

1.4

VEGETATION

1.4.1 VEGETATION ZONES

Garsen Division has four major types of natural vegetation (Fig.9). However, in most of the area, the natural vegetation has been cleared to give room for crop production.



I Acacia-Euphorbia (or Acacia Thorn-Bushland)

This type of vegetation predominates in the Nyika Plateau. This is a semi-arid vegetation type dominated by such species as Acacia senegal, Acacia seyal and Acacia lahai. Euphorbia nyikae and Euphorbia tirucalli are also common. Common grasses include Chloris myriostachya, Chloris gayana and Cenchrus ciliaris.

II Manilkara - Diospyros (or Lowland Dry Forest)

This type of vegetation is an extension of the Boni Forest in Lamu District and is found just north of Garsen Rural Centre and along a strip of land between the Tana River (a few kilometres south of the centre) and the Acacia Thorn-bushland. The predominant tree species are of medium to small size and include Manilkara densiflora, Manilkara eichii and Diospyros vaughanii. The dominant grasses are Digitaria mombasa and Chloris spp.

III Sterculia - Chlorophora/Memecylon

The lowland rain forest of the Sterculia-Chlorophora/Memecylon type requires a minimum of 1000 mm of rainfall annually or a high ground water table such as exists south of Witu where this type of forest is found. The dominant tree species are Chlorophora excelsa, Terminalia kilimanscharica, Tecleopasis glandulosa, Brachylaena hutchinsii and Manilkara sansibarensis.

IV Afzelia - Albizia/Panicum (Lowland moist savana)

This natural vegetation used to cover most of the area between Lamu and the Kilifi District Border. However, most of it has been destroyed by humans and now only a few patches of it remain. Most of the tall trees have been cut down. The predominant tree species in this area are Afzelia quanzensis and Albizia spp. Also very common are the Hyphaene compressa (Doum Palms). The palms are more fire-resistant than the other tree species and do well on water-logged soils. It is a very useful tree both to humans and wildlife.

V Mangrove forest and thickets

These are found at the mouth of the Tana River along the Kipini Coastline. The main tree species here are Rhizophora mucronata. The trees are cut to provide poles for construction but measures to control their exploitation have been taken by the Forest Department.

1.4.2 IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

The conversion of indigenous vegetation communities to agriculture, grazing land or degraded bushland is continuing at a fast pace. The loss of genetic diversity, wildlife habitats and wood sources will have immediate and long-term implications in the area.

As more dams are constructed upstream for generation of hydro-electric power and irrigation, river flow will be regulated and flooding may be substantially reduced. This situation will deny the floodplain of the annual deposits of alluvium which may alter the extent and nature of the floodplain vegetation.

1.5 FRESHWATER FISHERIES

The Tana River, and its ox-bow and flood lakes, are the main sources of the present catch which is sold in fish markets. The lakes include: Shakabobo, Chara, Kongolola, Moa, Chelaluma, Bulito and Balisa (Table 1.1) Fishing activities are concentrated around Garsen Urban Centre, Tarassa and Kipini.

Tilapia, Clarias and Protopterus are common species in the district. Although no detailed survey has been carried out in the district, the Pokomo are the only tribe which rely heavily on freshwater fish. Therefore most of the catch which is not consumed locally is sold in Mombasa or Malindi. However, commercial markets for freshwater fish have not been established due to infrastructural and technical constraints.

Fish farming has not yet taken root in the lower part of the district. The reasons including lack of permanent water courses and inadequate knowledge of fish farming.

Table 1.1

FRESHWATER FISH FROM TANA RIVER DISTRICT

	1979		1980		1981		1982		1983	
MONTH	KGS	KSHS	KGS	KSHS	KGS	KSHS	KGS	KSHS	KGS	KSHS
Jan.	7996	19200	4352	8881	1397	4266	27824	64036	91282	243785
Feb.	6757	14234	3301	8158	2361	12606	21725	58994	30700	79424
Mar.	5541	11937	15975	44528	258	516	19238	49149	32429	76862
Apr.	5361	12847	4132	12519	8890	24007	11566	30381	93208	250781
May	6199	18497	5306	14861	39443	114196	59713	155940	49088	121909
June	5161	14937	4827	12701	37531	79461	32886	90413	68037	185580
July	12655	28577	3867	9733	36487	96933	19004	55234	98833	258192
Aug.	4242	10809	2462	6536	54454	174969	60340	183701	59700	158193
Sept.	4838	11796	2980	7572	20508	60648	95062	289419	37501	93959
Oct.	4446	--	3478	8592	47100	127200	14124	38124	11515	28973
Nov.	4677	11690	4516	11068	31410	76665	32422	111399	81453	264674
Dec.	3944	8889	4157	8084	9875	27673	84250	241654	51094	188501

SOURCE: Fisheries Department, 1984

2.0

OVERVIEW OF THE HUMAN ENVIRONMENT

2.1

LAND TENURE

Land in Tana River District is not demarcated and the system of land tenure is largely communal (Table 2.1). The agriculturalists in the district live in clustered villages due to security reasons. Although these have rights of use, title deeds which can prove ownership have not been provided.

The vast area of land that has not been adjudicated is stateland. The Government has already started settlement schemes in Bura and Hola. People who are settled in the settlement schemes come from different parts of the country.

Table 2.1 LAND TENURE IN TANA RIVER DISTRICT

	Km ²
Government land	24,179
Freehold land	8
Trustland	1,645
Available for small holder Registration	12,862
Already registered	nil
	<hr/>
	38,694
	<hr/>

SOURCE: Government of Kenya, 1983

2.2

POPULATION

2.2.1 ETHNIC COMPOSITION

The ethnic composition of the population within the Lower Tana River area has been influenced by the diversity of resources as well as by the fact that the main communication route linking Mombasa to Lamu and the North-Eastern Province traverses the area. The drier sections are inhabited by pastoralists who include the Orma, the Boran and the Somali. They migrate into the area from North-Eastern Province especially during droughts. Along the Tana River live the above named pastoralist groups as well as Pokomo and Miji Kenda, who

are farmers. Some Arabs and Swahili/Shiraz live around Kipini. Within the lower Tana area are found three notable growth centres, i.e. Garsen, Kipini and Tarassa, Garsen, a divisional headquarters, has a number of civil servants from other parts of Kenya. The same applies to Kipini where there is a police post, a health centre and a fisheries depot. Trading activities in rural areas and the growth centres have attracted such ethnic groups as the Kikuyu, Meru, Kamba, Luo and Luhya. The area is also experiencing "ripple-effects" of ethnic distribution as a result of the Bura and Hola Irrigation Schemes which have been opened to all Kenyans. People are spreading into various parts of the district in search of opportunities.

2.2.2 DENSITY

The Lower Tana River area, according to the 1969 census, included about 17,422 people, thus registering a population density of 1 person per square km. The area's population had by the 1979 census shot to 31,891, yielding a density of 3 persons per square kilometre. (Table 2.2 and Fig. 10). This is generally a low population density compared to other areas in Kenya.

Garsen, the major growth centre of the area, experienced the same slow increase in population. By 1969 there were 2000 people while in 1979 the number had only increased to 2596.

TABLE 2.2 POPULATION DENSITY OF TANA RIVER DISTRICT SOUTHERN DIVISION

<u>LOCATION</u>	<u>POPULATION (1979)</u>	<u>DENSITY - POP./SQ.KM.</u>
BILISA	8148	1
NDERA	2956	9
SALAMA	5128	10
NGAO	7951	8
CHARA	7708	9
<hr/>		
SOUTHERN DIVISION	31891	3
<hr/>		

SOURCE: 1979 Census.

2.2.3 AGE-SEX DISTRIBUTION

The age-sex distribution indicates a high proportion of children (22.7% of the population) (Fig. 11) and a high dependency ratio (about 30% of the people are under 15 or over 65 years old). In 1979, the area recorded more men than women. The sex ratio was 101.8:100. The data used in Fig. 11 is for the whole district but probably the same picture holds for Lower Tana River area.

2.2.4 MIGRATION

Internal migration is a common practice in the Lower Tana River area. This is inevitable since a large section of the resident population is composed of nomadic pastoralists. The Orma practise seasonal internal migration in search of better pastures. There is also in-migration into the area by the Somali from the North-Eastern Province who migrate during the dry (Kiangazi) season in search of water and pasture, and they return to their home district when conditions improve.

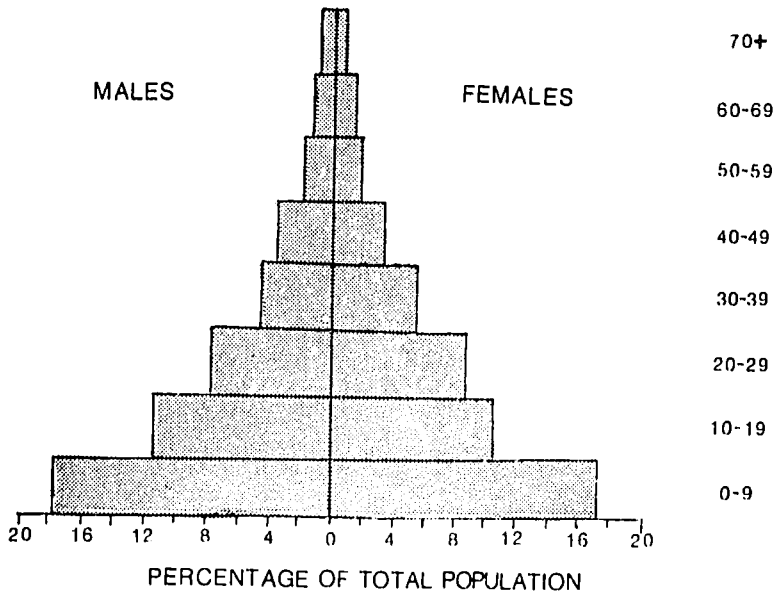
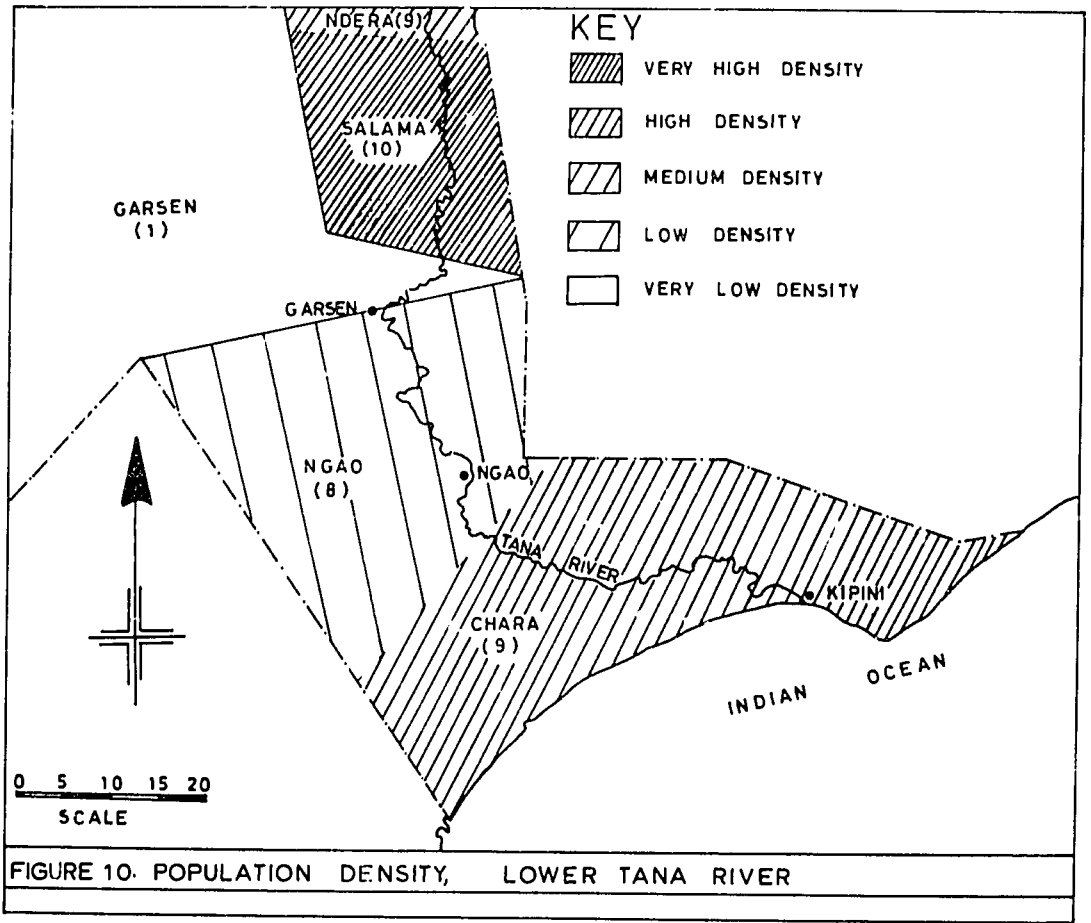
The development of irrigation schemes in the sparsely populated areas along the River Tana has caused it to act as a population receiving area. Otherwise, migration out of the area is minimal.

2.3 AGRICULTURE AND LIVESTOCK

2.3.1 AGRO-ECOLOGICAL POTENTIAL

Most of Tana River District, except for the moist or irrigatable areas near the river and the higher rainfall area near the Coast in the south-east falls within the ranching zone. (Fig. 12). The coconut-cassava zone L3 occurs in the south-eastern part of the district, with an average annual rainfall of more than 1,000 mm. Surrounding this zone is the cashewnut-cassava zone (L4) with an average annual rainfall of 800mm to 1,000mm. A large proportion of the Lower Tana river falls under the livestock-millet zone (L5) where the average annual rainfall is between 500mm and 800mm.

Within zones L3, L4 and L5 are large stretches of soils which are not suitable for agriculture due to seasonal water-logging.



SOURCE: Ministry of Economic Planning & Development, 1981

FIGURE 11. AGE/SEX DISTRIBUTION, TANA RIVER DISTRICT, 1979

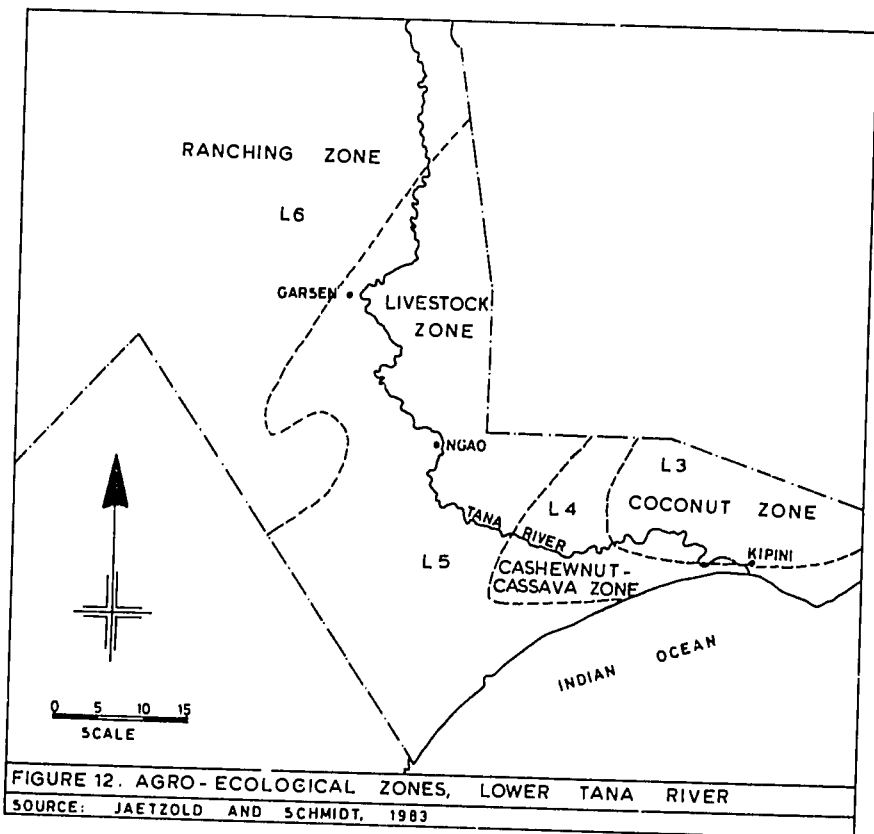
2.3.2 FARMING AND LIVESTOCK SYSTEMS

(a) Agriculture

The Tana River Valley has unlimited potential for irrigated agriculture owing to the fertile alluvial soils and the frequent floods of the river itself. The soils are generally black cotton with patches of sand, silt and clay resting on coral rock. (Fig. 13). With the continued construction of dams in the upper course of the Tana River, and diversion of the water for irrigation the annual flooding may decrease and deprive the floodplain of the annual supply of alluvium.

The soils have generally moderate to low fertility but fertilizers are used in very few places in the Lower Tana River area.

The people living along the river practise traditional farming and the main crops include cassava, bananas, sorghum, maize and rice. The crops are rainfed although occasionally growth and yields are enhanced by river flooding.



The most important constraints in agricultural development include lack of effective control over water resources and the constant threat from wildlife (particularly the hippos, buffaloes, baboons and quelea birds) to the little that is grown. The impact of wildlife on agriculture has increased since hunting was banned. Another constraint to agricultural expansion is the local technology available. Short hoes and knives are the chief agricultural implements, with slings being used for chasing birds from rice-fields. Most farmers, therefore, cultivate a bare minimum and as such seasonal food shortages are recurrent.

With low production expected from farms, there is a tendency to diversify sources of income off-farm income-generating activities include: weaving mats and baskets, pottery, fishing, and making bee-hives and fish traps.

In addition to smallholder farming, small-scale irrigation schemes are becoming important in the lower Tana River area. The schemes are managed by the Small-Scale Irrigation Unit (SSIU) based at Minjila. The area under small-scale irrigation is about 620 ha. Some of the schemes depend on natural floods while the rest depend on irrigation from diesel-powered pumps. Rice is the major food crop grown in these schemes in Garsen and other regions along the Tana River. Other food crops include, green grams, cow peas, sorghum, vegetables and coconuts. Bananas which are a staple food in the district, are grown along the river. Production of food crops generally falls below demand. Credit facilities have been lacking for a long time until April 1984 when the Agricultural Finance Corporation (AFC) opened an office in Garsen. Farmers are now being encouraged to take development loans to start manual irrigation through joint farming. Mangoes and citrus fruits are grown mainly for sale. Cash crops have no organised markets and it becomes very difficult for farmers to get a market for their product.

(b) Livestock

Pastoralism

The Ormas, who are pastoralists move from place to place with large herds of cattle (local zebu), sheep, goats, and donkeys in search of grass and water. The Ministry of Agriculture and Livestock Development (MALD) has intensified vaccination and other veterinary services in the area. Pastoralists face problems related to availability of water and grass and diseases. They market some of their livestock to outside markets.

RANCHING

There are four operating ranches in the district: three company ranches and one co-operative ranch (Ida-sa-Godana, which was started in 1964, and has

100 members from all over the district and 2,700 heads of cattle). Ranches are found throughout the district, but the operating ones are concentrated in Garsen Division.

Apart from the Ida-Sa-Godana Co-operative ranch, there are Giritu Company Ranch, Hagganda Private Ranch, Wachu Company Ranch and Kitangale Private Ranch. (Fig. 14). Dalu Ranch is owned by a village polytechnic. Hagganda, Dalu, Kitangale and Wachu ranches are located within the study area.

The ranches are financed by the Agricultural Finance Corporation (AFC). The animals are usually sold to local butchers in the district, Vipingo butcheries in Kilifi District and in Mombasa. There are no organised auction systems but there are two holding grounds, at Wenje and Kurawa. At present, animal skins are processed in some hides bandas owned by private individuals.

There are four communal cattle dips at makere, Garsen (constructed with EEC assistance), Kibusu and Oda. Some ranches have their own dips and Wachu ranch has a spray race.

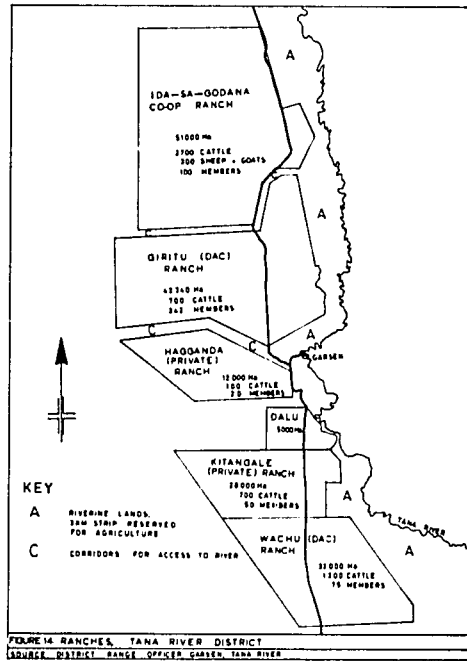
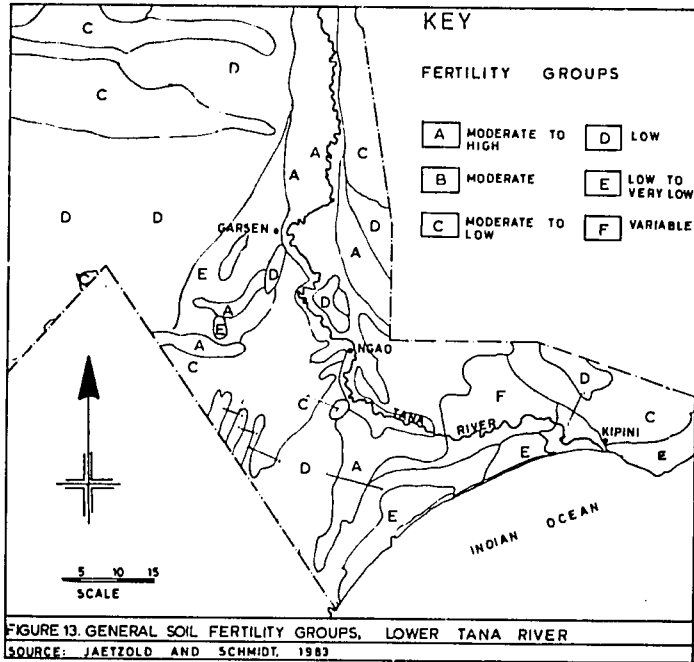
Overgrazing is a problem especially during the drought. 75% of the district is dry and during a prolonged drought, most of the animals are moved to the southern locations in search of grass. Livestock losses during the 1984 drought ranged between 30 and 50 per cent of the livestock in the district.

The increase in irrigation will of necessity increase the intensity of grazing especially during the dry season.

2.3.3. IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

Increasing agricultural productivity in the district will very much depend on the utilization of the Tana River for irrigation. As already stated, the agricultural potential of a very large area of the district is very low and the situation is made worse by unreliable rainfall and poor soils. The unused semi-arid lands could be used to support food crops such as millet and sorghum, and offer some potential for expanding food production.

The potential for livestock development, like in most dry areas of Kenya, is constrained by inadequate water supply and pasture during the dry seasons. Care should be taken to ensure that some areas of the district do not support livestock populations which are too large to be sustained efficiently from the grazing land available.

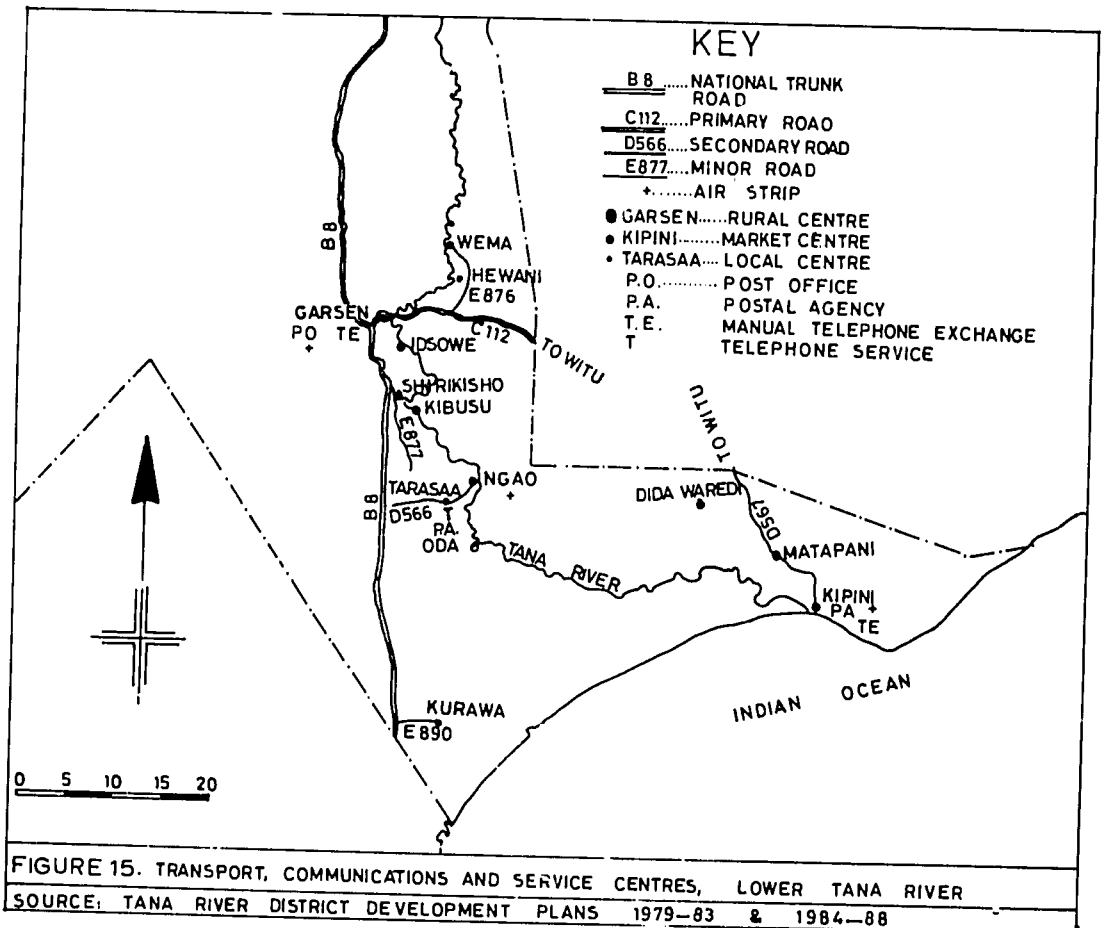


2.4

TRANSPORT, COMMUNICATION AND SERVICE CENTRES

2.4.1 TRANSPORTATION

Lower Tana River District lies within the Tana River flood plain. The area occasionally becomes flooded, disrupting transportation. The road network in this region is inadequate and many centres are not served by any classified road (Fig 15). Some villages can only be reached with difficulty, even during the dry season due to deep, loose, sandy soils. The flat terrain and soils offer poor road drainage which compound problems. There is lack of good materials, like murram, for road construction, adequate qualified personnel, machinery and funds. Thus public transport is limited only to the classified roads. However, during both the short and long rains most of these roads become impassable and people have to walk. During severe floods, the area is completely cut off and inaccessible by road as happened the 1961 floods which required air -lifts of food to stranded residents.



The poor roads discourage production due to inability to reach markets. However, there are plans to upgrade and maintain most of the classified roads subject to availability of funds. This includes tarmacing the B8 road (from Garissa to Garsen) and C112 (From Garsen to Mokowe-Lamu District). The D567 from Witu (Lamu District) to Kipini and D566 from Tarassa to Ngao are also scheduled for improvement. There are plans to build a bridge across Tana River at Garsen to replace the hand pulled ferry which is dangerous during floods and has a small capacity. Classification of more roads in this region is necessary so that they can be maintained by the Ministry of Transport and Communications (MOTC) and even upgraded to all weather roads. These roads should reach such centres like Wema, Oda, Golbauti, Kau, etc.

There are three earth airstrips in this region located at Garsen, Kipini and Ngao. These airstrips are affected by floods although they are very important to the flying doctors services, security and administrative purposes and the occasional chartered flights.

Sea transport is not important as only small fishing boats can reach Kipini. People can also board boats at Kipini when the C112 road across the Tana River flood plain is impassable. Small canoes are very important especially for crossing the Tana River.

2.4.2 COMMUNICATIONS

There is a departmental post office at Garsen with 50 boxes, and plans for 50 additional boxes. The contractor for carrying letters is Tana River Bus Service. There is a postal agency at Tarassa which is operated by a private agent and the Government runs the Kipini postal agency.

As noted above, the roads become impassable during the rainy seasons, which affects the delivery of letters by road. Sometimes during floods letters are delivered by air. The distribution of postal services is inadequate and there is need for expansion of this service.

Telephone services are limited to Garsen, Tarassa and Kipini. There is a manual telephone exchange at Garsen with 70 lines with only 27 subscribers. The demand is low.

There are two trunk telephone lines to Malindi and one to Hola. A telephone line extends from Garsen to Tarassa. The manual telephone exchange at Kipini operates through Lamu. At Tarassa and Kipini there are attendant call offices

for public use. There is a microwave transmission station at Garsen.

Other means of communication are the radio and newspapers. The radio reception and newspaper circulation are both poor. Newspapers do not reach many of the small centres.

2.4.3 SERVICE CENTRES

Most of the people live together in villages or centres scattered throughout the area. Garsen is the only rural centre in the district. Out of five market centres in the district, Kipini is the only one located in the Lower Tana River area. Tarassa/Ngao is the only local centre out of nine in the District. The distribution of designated service centres in this region is inadequate and people travel long distances to visit a service centre.

2.4.4 IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

Transportation is essential as a means to hasten development. However, the present means of transport is inadequate and becomes even more unreliable during the wet season due to flooding. Thus there is need to develop the airstrips to support both road and water transport during the wet seasons.

The present communication systems are inadequate and below the required standard to effectively cater for the public. The communications systems should be improved and expanded to reach more people.

The present number of service centres is very low. The services rendered in these centres are also poor. This calls for more services centres provided with essential facilities to cater for the people.

2.5 INFRASTRUCTURE

2.5.1 WATER SUPPLY

The District depends on the Tana River for provision of most of the water required by people, livestock, wildlife and for irrigation. There are two major water supply schemes in the area: Garsen water supply and the Ngao - Tarassa water supply. Kipini and Oda water projects are still under way (Fig. 16). Garsen water supply, has a capacity of about 100,000 litres in an elevated tank.

The quantity is not enough due to the high population growth in the area. Elsewhere along the valley people depend on wells constructed in villages on self-help basis and local unimproved sources.

2.5.2 HEALTH

a) Diseases

The major environmental health problems in the Tana River District are diseases such as bilharzia or schistosomiasis, malaria, diarrhoea, intestinal worms, pneumonia, tuberculosis, acute eye infections and skin diseases. These diseases are prevalent in the district due to poor environmental conditions. (Table 2.3). These diseases can only be controlled if emphasis is placed on environmental sanitation e.g. protection of wells, provision of household latrines, proper methods of waste disposal, vermin and insect control, etc.

An immunisation programme has been started in the district based at Ngao Hospital. It is intended to cover the whole district in order to reduce preventable diseases such as measles, polio, tuberculosis, diphtheria, pertusit and tetanus.

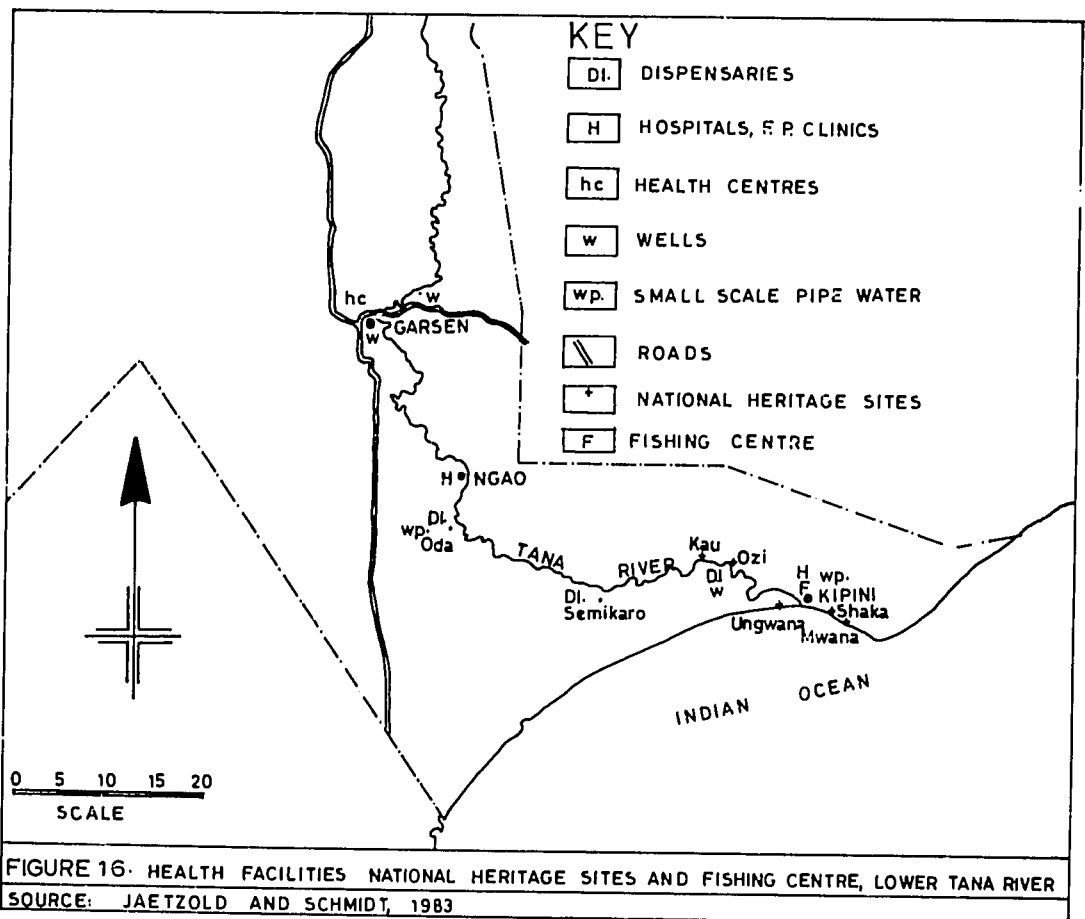


Table 2.3 RECORDED CASES OF DISEASES: IN THE LOWER TANA RIVER AREA, 1985

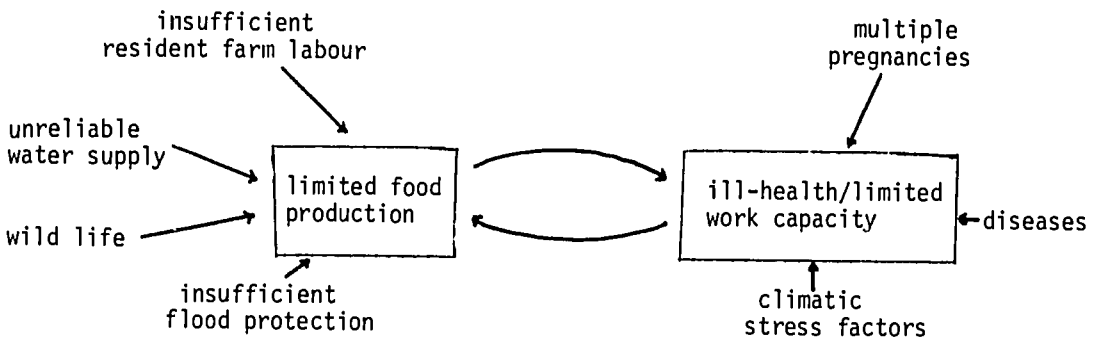
<u>Diseases</u>	<u>Cases</u>	<u>Deaths</u>
Pneumonia	400	9
Measles	160	2
PCM	177	2
Malaria	16203	2
Anaemia	379	1
Neonatal Tetanus	14	1
Bilharzia	518	-
Diarrhoeal Diseases	1047	-
Acute Respiratory Infections	3687	-
Diseases of Skin & Ulcers	2706	-

SOURCE: Ngao Hospital (1982)

b) Nutrition

The marginal nature of the Pokomo subsistence agriculture has consequences for the health of the population. Wilcocks and Mason-Bahr (1972) illustrate the relationship between "limited food production and ill-health - a vicious circle in which insufficient food is produced because of, but at the same time a cause for ill-health" (Budelman 1983):

THE INTERACTION BETWEEN FOOD PRODUCTION AND HEALTH



SOURCE: Wilcocks and Manson-Bahr 1972

This generalisation is a conclusion made from a haemoglobin survey carried out on 1031 people of various age-groups. A below average haemoglobin count was recorded especially among mature women and children below 19 years of age.

According to Wilcocks and Manson-Bahr, the factors accounting for anaemia are: diet (both bulk and composition), cultural practices regarding use of food, intestinal parasites, malaria and multiple pregnancies.

c) Health Facilities

There are hospitals at Ngao and Kipini and a sub-hospital at Garsen. The Kipini hospital is old and underutilised. Renovation is currently going on to enable the hospital to serve a larger area. There are plans to expand the Ozi dispensary in Chara location. Table 2.4. shows the current health facilities in the area.

Table 2.4. HEALTH FACILITIES IN THE LOWER TANA RIVER AREA

FACILITY	LOCATION	STATUS	CAPACITY (BEDS)	STAFF
NGAO HOSPITAL INCLUDING F.P. CLINIC	NGAO LOCATION	SUB DISTRICT HOSPITAL	78	58
KIPINI HOSPITAL INCLUDING F.P. CLINIC	KIPINI IN CHARA LOCATION	SUB HOSPITAL	16	-
ODA DISPENSARY	ODA IN NGAO LOCATION	DISPENSARY	-	2
SEMIKARO DISPENSARY	SEMIKARO IN CHARA LOCATION	DISPENSARY	-	2
OZI DISPENSARY	OZI IN CHARA LOCATION	DISPENSARY	-	2

SOURCE: Medial Officer of Health, Hola (1984).

The health facilities are far apart and some become inaccessible during the wet season and yet the need for medical treatment is more pronounced during the wet season than when it is dry and travelling is easy (Chambers 1980).

The family planning programme is now widespread in the area through the social workers based at Ngao hospital and at three health centres but it needs to be intensified further.

2.5.3 ENERGY

There is no hydro-electricity in this area. There are a few private generators in Garsen, Ngao and Kipini that supply electricity to selected premises. Paraffin is used mainly for lighting purposes. There are petrol stations at Garsen and Tarassa. Cooking gas (LPG) is used on a very small scale, mainly in towns. Solar energy is utilised in the traditional methods such as drying foodstuffs, firewood and fish. Woodfuel is the main source of energy. Firewood is mostly used in the rural homes and charcoal in the growth centres mainly for cooking and heating purposes. Firewood is scarce in the vicinity of villages but it is plentiful far afield.

The demand for woodfuel is increasing and there is need for concerted efforts to maintain and even expand the existing woodlots through afforestation, and agro-forestry to supply woodfuel, fencing posts, building posts and even timber.

2.5.4 EDUCATION

a) Primary Education

The distribution of schools depends on the distribution of population. As such, schools are found along the Tana Valley and in a few nucleated settlements along roads (Fig 17). Table 2.5 below shows the number of schools, teachers and enrolments over five years.

TABLE 2.5: PRIMARY EDUCATION STATISTICS; LOWER TANA RIVER AREA

	1983	1982	1981	1980	1979
No. of School	16	16	16	14	14
Enrolment: Boys	2084	1970	1810	1585	1383
Girls	1530	1443	1237	1077	996
Total	3614	3413	3047	2662	2379
Teachers: Trained	97	94	92	91	83
Untrained	27	28	31	29	23
Total	124	122	123	120	106

SOURCE: Education Officer Garsen 1984

b) Post-Primary Education

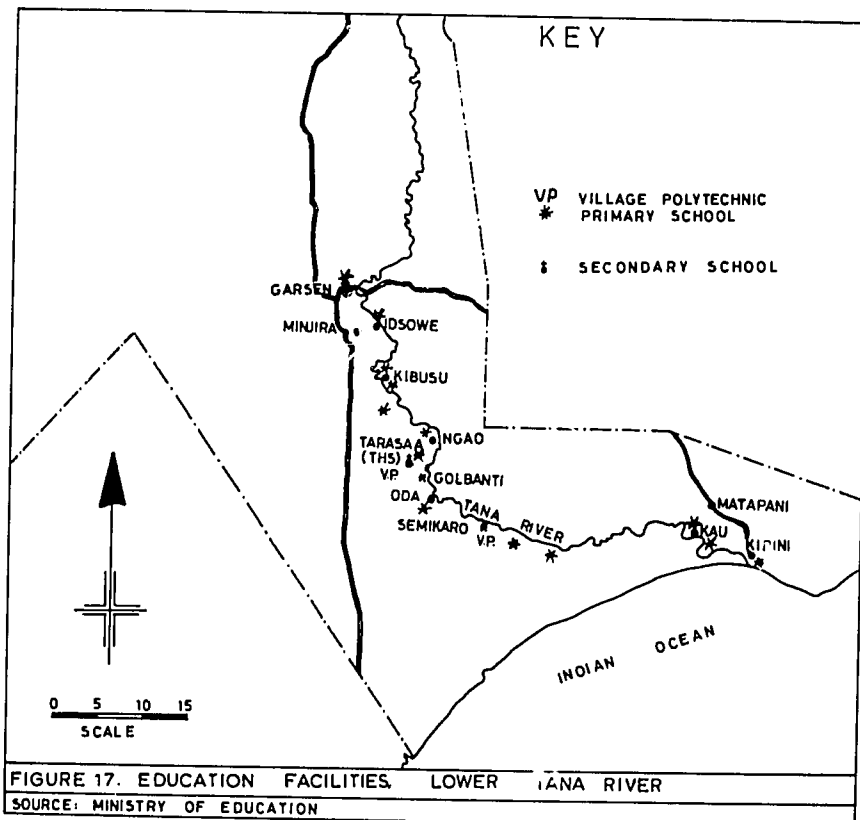
Tarassa High School is the only post-primary institution in the area. Although it is a double-stream mixed school with boarding facilities, it cannot cope with graduates from sixteen primary schools.

There are two village polytechnics, at Tarassa and Dalu. They enable primary school leavers to acquire skills in various trades to enable them to become self-employed and self-reliant. Their facilities should therefore be improved and expanded, and the courses diversified. The courses offered are shown in Table 2.6 below.

TABLE 2.6: COURSES OFFERED AT VILLAGE POLYTECHNICS, LOWER TANA RIVER AREA

Name	Courses offered
Tarassa	Masonry, Carpentry/Joinery Home Economics, Tailoring
Dalu	Crop Husbandry, Animal Husbandry, Maintenance of Farm Equipment

SOURCE: Education Officer, Garsen 1984.



c) Adult Education

A large section of the area has a scattered population, making it a poor target for adult education services and supervision. Enrolment has also been poor due to pastoralism, poverty and general apathetic attitudes to new ideas. This also makes recruitment of local teachers difficult. The number of centres, teachers and enrolment are shown in Table 2.7.

TABLE 2.7 ADULT EDUCATION, GARSEN DIVISION, TANA RIVER DISTRICT

	<u>Full-time</u>	<u>Part-time</u>	<u>Self-help</u>	<u>Total</u>
No. of Centres	12	20	6	38
Enrolment				
Male	50	146	63	259
Female	210	376	60	646
Total	260	522	123	905
Teachers				
Div 3	5			5
Div 4	7	3		10
C.P.E.		17	6	23
Total	12	20	6	38

SOURCE: Divisional Adult Education, Garsen 1984

2.5.5 IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

The flat nature of most of the floodplain and the occasional flooding of the river have given rise to many patches of stagnant water which form breeding grounds for vectors of communicable diseases. Coupled with inadequate potable water supply systems, inadequate and sometimes inaccessible health facilities, and inadequate health education, preventable diseases are quite prevalent in the area.

2.6

NATURAL HAZARDS

Mankind is periodically plagued by natural disasters resulting from geological events such as earthquakes, landslides and volcanic eruptions; atmospheric and phenomena such as severe storms and lightning; and disasters resulting from a combination of geological and climatic factors, e.g. floods and droughts. The balance of natural versus man-made disasters is determined by the magnitude of the natural phenomenon and the vulnerability of the human activities.

In Lower Tana River area, available data show that some of these disasters have occurred in the past and are likely to happen again. The low-lying nature of the land and the general climatic conditions mark the area for such disasters as floods and droughts.

2.6.1 FLOODS

A 1961 report on famine and floods in Kenya shows that from 24th September to 31st December, 1961 Kenya experienced the heaviest and most prolonged rainfall since records were kept (Roberts 1961). Daily falls of 75 to 125mm were frequent and monthly totals far exceeded anything previously recorded. In September, 48 hours of extremely intense rainfall caused extensive flooding in the Lower Tana and Galana/Sabaki River Basins. Many areas north of Mombasa, particularly Malindi, Garsen and Lamu received between 37 and 50cm. of rain in less than two days.

On 30th September, 1961, flooding was reported in the area north of Malindi with widespread damage and some loss of life. Communications between Mombasa, and the flooded areas were broken. Supplies of foodstuffs and other basic commodities had to be airlifted to these areas.

Although the 1961 flood was largely fed from upcountry rainfall, local flooding was also reported. Rainfall intensities resulted in a high rate of run-off and flooding of low-lying areas damaging roads, bridges, crops and even dwellings. The probability of local floods has not been estimated. The 1961 floods are estimated to have a 1% chance of occurring in any year

2.6.2 WINDSTORMS AND SEVERE STORMS

Severe windstorms have been known to tear roofs off buildings, collapse walls of buildings under construction, loose coconuts from their stems and even

uproot trees which may fall on animals or human beings leading to loss of life. The storms also lead to severe soil erosion by wind and subsequent heavy rains. It is difficult to document occurrence of these windstorms especially in the rural areas where property is not insured. Nevertheless there have been various reports of damage from high winds in the area.

2.6.3 DROUGHTS

Most of Tana River District is susceptible to drought conditions (Table 2.8). From January to August 1961, most of the inland areas of the Coast Province received less than 57% of the average rainfall. During this period most farming and ranching areas suffered from severe shortages of water, for crops grasslands, and domestic supply. In 1976, weather conditions in the Coast Province were characterised by high temperatures and low rainfall. The days were hot and humid. Ministry of Agriculture reports indicated that drought adversely affected ranches resulting in death of many calves and milking cows. There was also severe drought conditions in 1978-79 in the District and subsistence had to be sought from outside. During 1984 severe drought in middle Tana River District forced many pastoralists to move into the Lower Tana River area. High livestock deaths and some conflicts with the agriculturalists were reported.

The scanty information indicates that the Lower Tana River area is prone to droughts although the frequency and magnitude has not been established. However, drought of various degrees is a phenomenon that should be guarded against as it causes havoc for humans, livestock and crops.

2.6.4 IMPLICATIONS FOR ENVIRONMENT AND DEVELOPMENT

Rare extremes of natural forces are difficult to predict, but they can be anticipated. Floods like those of 1961 cannot be discounted. Construction of shelter near river bottoms, in low-lying areas and near the ocean's edge should be avoided.

Large dams constructed upriver should include flood storage reservoirs to regulate water downstream. The storage of water could be of economic value for hydro-electricity, water supply and irrigation. But these development schemes must include ways and means of controlling mosquitoes and bilharzia.

There is a need to provide other varieties of trees for windbreak other than the coconut trees common along most of the coast. Experiments and planting of both indigenous and exotic drought-resistant trees should be carried out to provide a stronger windbreak in case of windstorms. The Baobab Farm on the Bamburi Cement Factory land provides a good example of trees to plant. Fruit trees like banana, mango and guava trees have been very successful. Apart from providing a windbreak, these trees would provide nutrients otherwise lacking in most areas of the district.

Droughts have been experienced in the Lower Tana River area necessitating subsistence to be sought from outside the district. Dependence on rice, maize and cassava as staple foodstuffs should be supplemented with other varieties of drought-resistant or drought-avoiding crops.

TABLE 2.8 DROUGHT OCCURRENCE IN THE KILIFI DISTRICT AREA

YEAR	
1850s	Famine among Duruma in Kwale, probably exacerbated by Masai raids
1884	Famine in Jibana, called Nzala ya Maembe
1883/5	Famine among Nyika, called famine of Mwakisenge
1889/90	Famine of Wkufu (or 'Magongo'), also rinderpest among Giriama
1900/00	Famine among Nyika. Children sold for grain, migration of Giriama and Pokomo.
1901	Famine of "Kodi-Kwandza"
1904	Famine of "Rupia tahu tahu"
1914	Famine of "Muzungu"
1915	Famine of "aini"
1918	Famine of "Pishi Mwenge"
1921	Severe drought in Lamu
1930	Moderate drought in Malindi
1933	Moderate drought in Lamu
1939	Moderate drought in Lamu
1949	Severe drought recorded in Lamu, Malindi and Mombasa
1952	Severe drought in Lamu and Mombasa
1954	Moderate drought recorded in Lamu, Malindi and Mombasa
1955	Moderate drought in Mombasa
1956	Severe drought in Lamu
1958	Severe drought in Lamu
1963	Moderate drought in Malindi and Mombasa
1965	Moderate drought in Mombasa
1969	Severe drought in Malindi
1970/71	Moderate drought in Mombasa
1974	Severe drought recorded in Lamu, Malindi and Mombasa
1983/84	Severe drought in Central and Eastern Kenya, including most of Tana River District.

SOURCE: Kelly 1960, Downing, 1992

PART II:

ENVIRONMENT AND DEVELOPMENT

3.0

THE NATURAL ENVIRONMENT

3.1

INDIGENOUS FOREST

The greatest threat to the indigenous forests in the area comes from humans. As the population increases, more natural vegetation cover is cleared to make room for both cash and food crops. The low fertility of the soils in the Tana River Basin makes this exercise even more necessary. After clearing the natural vegetation along the river basin, building poles become scarce in the area and people look for the poles from the mangrove thickets along the coastline. Fortunately the mangroves are under the management of the Forest Department and their exploitation can therefore be checked.

There are some patches of sacred forest in the area which serve similar purposes like the Kayas of Kwale and Kilifi districts. These forests are locally known as Gasas and although at present they are apparently under no pressure, they will need protection when population density increases.

In some areas, e.g. at Garsen the vegetation cover destruction has been so intense that the river banks have been left unprotected from the strong current of the river. As a result large chunks of earth keep falling into the river thus wasting valuable soil, which later goes down into the ocean to damage the marine ecosystem. Charcoal burning is mostly carried out at Wachu and lack of transport makes it difficult for control measures to be enforced.

There is only one tree nursery in the Division raising exotic seedlings usually the Casuarina and Eucalyptus types.

3.1.1 RECOMMENDATIONS

Indigenous plant communities should be protected for their genetic diversity and as a refuge for wildlife. This should be done by encouraging farmers to practise agro-forestry and establish woodlots for fuelwood supply.

More tree nurseries should be established and supported to provide enough seedlings for farmers.

3.2

MARINE FISHERIES

Tana River District has a short coastline which is about 71 km long. The shore line is characteristically a sand dune shore with patches of mangrove strubs in the estuaries and sheltered shores at Kipini, Elephant Island and Kilima - Simba. (Fig. 9). The fishery resources are the only notable marine resources being exploited.

There are broadly two main fishing zones namely: inshore and offshore waters. There are also two main fishing groups characterized by the types of fishing crafts they use. The local artisanal fishermen use the typical small boats, and canoes whereas trawlers are used by foreign fishermen and other local organised establishments, eg. Wananchi Marine Products, Samaki Industries and Kenya Fishing Industries which are all based in Mombasa.

3.2.1 THE STATE OF MARINE FISHERIES

The Marine fisheries of this district lie in the North Kenya Banks area which is known to be a rich fishing ground (Mesyatsev 1979, FAO 1983, NORAD 1984). Whereas the artisanal fishermen cannot venture far into the offshore waters due to their small crafts, the offshore waters are exclusively exploited by the foreign fishermen and those from the Kenyan organisations which are capable of purchasing and maintaining large fishing vessels.

To the majority of fish eating residents of Tana River District the marine fish are uncommon in their daily meals compared to the freshwater fish. Of the total fish landed in this district freshwater fish account for 94.5%. Only a small quantity of marine fish is available because marine fishing villages which are located on the sparsely populated northern side of Tana River are inaccessible, especially during the rainy periods. During the rainy period the marine fish may be transported by boat from Kipini (Fig. 16) to Malindi from where it is transported to Mombasa by road.

The prices per kg. (Wet weight) of the various fisheries items paid to the fishermen at the landing depots are same as those of Lamu District (Table 3.1).

Table 3.1 PRICE PER KG (WET WEIGHT) OF MARINE FISH AT LANDING DEPOTS IN TANA RIVER DISTRICT

<u>Item</u>	<u>Price per kg (K.SHS)</u>
Fish GI	5/50
Fish GII	4/10
Fish GIII	2/50
Kingfish G I	13/80
Kingfish GII	8/90
Lobsters	40/50
Prawns GI	13/50
Prawns GII	10/80
Crabs	10/00
Squid	4/00
Parrot fish	1/20

SOURCE: Fisheries Department Lamu Office. 1984

The main limitations which affect the fishing activities are cold storage facilities and the small crafts which are too weak to venture into the offshore waters.

Although the marine fisheries landings in the district are very small, most offshore fishing vessels, which net the biggest catches (larger than the inland fresh water fish catches), land their catches in Mombasa. This fishery is profitably exploited by local organisations like Wananchi Marine Products, Samaki Industries and Kenya Fishing Industries and foreign organisations which own offshore fishing vessels.

The types of fishery statistics gathered indicates that the state of the fishery is to be assessed in terms of comparisons of the annual catches and the potential yields. Presently, the inshore annual catch records are available (Table 3.2) but the inshore potential yield values are lacking. As regards the offshore fishery, the potential yield is known (Table 3.3) but the annual catch records are not known because the firms operating offshore fishing vessels are not willing to give such data. Under these circumstances the available figures

cannot usefully reveal the nature of the present status of the fishery in this district. However, the fisheries authorities contend that there is no overexploitation of stocks yet.

Table 3.2 KIPINI MARINE INSHORE FISHERY STATISTICS.

Year	Weight (KG)	Cost (KSHS.)
1983	23,373	104,871
1982	29,625	136,702
1981	53,550	220,022
1980	81,659	322,125
1979	40,008	191,725
1978	56,396	185,240
1977	53,210	131,609

Note: The number of fishermen is about 100.

SOURCE: Fisheries Department, Lamu Office, 1984

Table 3.3 BIOMASS AND POTENTIAL YIELD OF OFFSHORE FISHERY AT THE NORTH KENYA BANKS

<u>Species groups</u>	<u>Biomass (t)</u>	<u>Potential Yield (t)</u>
A. Sharks and Rays	1285	161
B. Big commercial fish	3891	517
C. Small commercial fish	48	14
D. Small non-commercial	470	141
E. Swimming crabs	1333	1000
F. Cephalopods	102	77
Total of all species	7129	1910
Total except D and E	5326	769

SOURCE: FAO 1983.

3.2.2 RECOMMENDATIONS

There is need to determine the inshore potential yield and to impose directives which would make it compulsory for all offshore fishing vessels fishing in the Kenya waters to declare their offshore catches. This will help in assessing the marine fishery.

4.0

THE HUMAN ENVIRONMENT

4.1

POPULATION GROWTH AND RESOURCES

The Lower Tana River area is a region of resource diversity. Within an area of 9,189 square kilometres (Garsen Division) is found large tracts of land suitable for ranching, hence the existence of over nine ranches. Also found here is a zone fit for both livestock as well as millet, another one where cashewnuts and cassava do well and also the coconut - cassava zone around Kipini. The Garsen Division has potential for agriculture as is well illustrated by the Pokomo farms in Ngao Location. There exists also an almost unlimited potential for irrigated agriculture along the Tana River Basin especially in the Lower Tana area. The already existing irrigation schemes at Ngao village and at Hewani are very encouraging examples. The Division is also well endowed with marine resources. Fishing along the Tana River as well as in the Indian Ocean contributes to the food stock and income of the people.

The Lower Tana area, according to the 1969 census, recorded about 17,422 people. This figure, by 1979, had risen to 31,891 an increase of 45.4%. When the above cited resource background is juxtaposed with the current size of human population within the area, it is clear that the area's human carrying capacity has so far not been reached. Large tracts of prime farm land are lying idle in some parts of Garsen Division, pointing out the need for more people so as to speed up the development of the area.

However, the population is on the increase. The population density was 1 person per square kilometre in 1969. This rose to 3 persons per square kilometre in 1979. The growth rate of about 4% per year is quite high and family planning efforts have yet to take root. The family planning programme is being marred by, among other causes, the prevailing high level of illiteracy, problems in communications, shortage of staff as well as a conservative rural population. Thus, there is potential for high population growth within a short span of time, triggered especially by the opening up of more irrigation schemes to people from other areas of the Republic. At the same time, the area has its share of problems. Large areas of Garsen are endowed with poor soils, which when exposed to the elements deteriorate fast. This implies that vegetation clearing has to be minimal so as to maintain the fertility of the soils. The existing infrastructural facilities within the area are also very poor and inadequate. Their provision is compounded by the nomadic nature of such ethnic groups as the Orma and Somali. Transport facilities are subject to weather variations as indicated by the impassable conditions of most roads during the

the rainy season. The flat terrain that characterises this area is prone to seasonal flooding, hence the existence of mosquitoes which are responsible for the widespread incidence of malaria.

Recommendations:

There is need to balance population growth with the area's resources. This calls for foresight by the planners so as to ensure that potential population growth does not outstrip the existing resources.

The development of Garsen, Kipini and Tarassa growth centres is essential. These, if well developed and supplied with adequate infrastructure, will speed up development of the rural areas by providing markets for their produce as well as providing essential services to the people.

There is need to strengthen the existing family planning efforts through more involvement of the menfolk, increasing the number of field staff and training more local community leaders who will identify easily with the people.

4.2 HOUSING

4.2.1 URBAN AREAS

The Lower Tana River area has no designated urban centres as such, but within the area are found: Garsen, a rural centre, Kipini, a market centre and Tarassa which is a local centre. Garsen is the headquarters for Garsen Division, has a sub-district hospital, a sub-post office and a police post, and is a major trading centre as well as a road communication node. The types of residential houses found in Garsen include the permanent stone-walled and galvanised iron sheets roofed houses which house a few civil servants as well as traders in the town. Another dominant type of house within the centre is the mud and wattle walled house, roofed with iron sheets. Also found within the vicinity of the town are the semi-permanent Pokomo houses whose walls are constructed of mud and wattle while the roofs are thatched with grass. The Ormas put up their portable structures while on transit in search of grass. At Kipini, the Bajuni house is common. This comprises of mud walls reinforced with coral stone pebbles and wattle while the roof is thatched with either grass or the more expensive makuti. There are also a few stone walled and iron sheet roofed permanent houses for civil servants. Tarassa, in Ngao Location, is a dynamic local centre surrounded by a rich agricultural hinterland. Within the centre are a few permanent residential houses while the Pokomo, who are the majority there, have constructed

semi-permanent houses of mud and wattle walls and iron sheet roofing.

Environmental problems associated with housing in the urban areas of Lower Tana are common. Infrastructural facilities within these centres are grossly inadequate. Electricity supply is only from generators which are expensive to run and can only be afforded by very few people. Water supply is also inadequate except for Garsen where there exists a public water supply. There is poor sanitation within the houses while there is also a dire shortage of housing especially for civil servants. The situation regarding Government housing over the past years has not been given the necessary consideration. Government departments have expanded without a corresponding expansion of institutional houses or Government pool houses. Currently some Government officials are living in houses that have been condemned to be unsuitable for human occupation. Lower Tana area is reckoned as a habitat for very aggressive mosquitoes. The majority of houses, however, are not constructed with the mosquito menace in mind, hence the high incidence of malaria. There is also overcrowding in some of the houses while most houses are fire prone.

4.2.2 RURAL AREAS

The state of housing within the rural areas of Lower Tana is generally poor. The larger part of the area comprises rangeland which is suitable only for ranching, thus discouraging sedentary human settlement. This includes Bilisa Location as well as parts of Ngao location. Here are found over nine ranching schemes wherein are found both permanent residential houses as well as temporary structures for herdsmen. Another agricultural zone is the lowland livestock and millet zone wherein falls Garsen as well as some stretches of Ngao Location. Here are found semi-permanent houses used by the agricultural Pokomo and also the temporary portable structures housing the nomadic Ormas. The Orma houses are constructed by women. The coconut-cassava zone around Kipini is characterized by the typical Bajuni house of mud and wattle walls and makuti thatch roofs.

The provision of residential houses within the rural areas is usually left at the discretion of the people themselves. Thus, housing types within the rural areas are a reflection of a people's mode of living. Given that most of the rural people in Lower Tana River are conservative, it is most likely that a change in the state of housing within the area will be gradual. Perpetuating this situation are other factors such as poverty prevailing within the area, the high level of illiteracy among the rural folk, the apathy towards self-help (harambee) efforts in housing construction and the pattern of land

ownership which makes loan procurement rather difficult. In addition, there are the practical difficulties posed in the construction of houses on a generally flat terrain which is prone to flooding and water-logging during the rainy season. Sanitary facilities within the rural houses are very poor. Overcrowding within these houses is common while the rural houses, especially the Orma type are prone to such disasters as fires and floods.

4.2.3 RECOMMENDATIONS

There is need to increase Government housing accommodation, especially now that more Government officials are going into the district as a result of the district focus for rural development.

There is need for the provision of adequate infrastructure within the designated growth centres. Currently, the distribution of water, electricity and good roads is in a poor state. Sanitary facilities also require immediate attention.

Voluntary participation in housing development should be encouraged especially in the rural areas.

A properly planned growth centre policy should be pursued to cover such potentially dynamic centres as Garsen, Kipini and Tarassa.

There is need to educate the people as to the advantages accruing from proper housing and improved sanitation.

4.3

AGRICULTURAL DEVELOPMENT

In Kenya, agriculture (including livestock) is the nation's major source of food, foreign exchange and employment. For the agricultural sector to supply food required by a growing population, produce more for export and provide work for the expanding labour force, it must grow at a fast rate. If agriculture grows more slowly than the population, an increasing share of its resources must be directed to food acquisition (Government of Kenya 1982).

The National Food Policy (Government of Kenya 1981) aims at giving a set of guidelines for decision-making on all aspects related to food production, processing and marketing in order to ensure that Kenya is able to avoid widespread food shortages. The objectives of the National Food Policy are:

- (1) to maintain a position of broad self-sufficiency in the main food stuffs in order to enable the nation to be fed without using scarce foreign exchange on food imports;
- (2) to achieve a calculated degree of food supply for each area in the country; and
- (3) to ensure that the food stuffs are distributed in such a manner that every member of the population has a nutritionally adequate diet.

Rapid growth in agricultural development can be achieved through the expansion of acreage under crops and increases in yields per acre. In Tana River District, increased production can be achieved through the expansion of acreage under crops; irrigation and drainage schemes; full utilization of idle land; use of new and improved varieties of seed and crops; more extended use of fertilizers, insecticides and pesticides; better land management; improved access to markets; introduction of better land reform programmes.

4.3.1 CONSTRAINTS TO INCREASING AGRICULTURAL PRODUCTIVITY

The major constraint is the availability of inputs which becomes worse during the rainy season because roads become impassable. Farmers are not able to get most of the necessary inputs, such as fertilizers, good seeds and insecticides.

Wildlife damage to crops is also a serious problem, particularly along the area near the Ocean.

The traditional land tenure (see section 2.1) impedes agricultural development. Since the farmers do not hold any legal title to their land and do not have their holdings registered, this precludes the use of their land as collateral for loans which could be used for improving their holdings.

For most cash crops, there is a lack of organised marketing systems. Some farmers are forced to carry their produce to Malindi or Mombasa, and this is only possible during the dry seasons, but most of them sell their product to traders who offer very low prices. There are no markets for coconuts, mangoes, bananas and horticultural crops.

The other problem which affects productivity of agriculture, is natural hazards: persistent drought which causes shortages of water in the irrigation schemes and crops being washed away by floods.

Infrastructure in the district is not well developed. When roads become impassable during rainy seasons, agricultural technical offers do not reach the farmers.

Due to poverty, most farmers cannot afford to buy fertilizers, especially in the Lower Tana village irrigation schemes.

4.3.2 PROGRAMMES UNDERWAY

In Mnazini and Hewani, the Lower Tana village irrigation programme assists farmers by setting up the main structures in the schemes and doing most of the work. The farmers are primarily involved in land preparation. In all there are about six irrigation schemes assisted by the Netherlands Government. There is a coconut nursery at Kipini which intends to produce seedlings of high quality and give them to the farmers. This programme also serves as a demonstration plot.

Research is being carried out on a variety of beans that will not require a lot of rain. Research is also undertaken on new varieties of pigeon pea, cassava, sorghum and sweet potatoes. Implementation of these programmes is constrained by shortage of staff and inadequate vehicles. Most of the programmes have tended to put very little emphasis on ways to increase production of food crops.

4.3.3 RECOMMENDATIONS

Now that the Agricultural Finance Corporation has opened a branch in the district, the small-scale farmers should be assisted and encouraged to take development loans for small-scale irrigation.

The Ministry of Tourism and Wildlife should carry out some cropping in order to keep the numbers of the animals down.

The Malindi - Garsen and Garsen - Hola, roads should be improved to all weather (murram or tarmac) standard.

Farmers who grow cash crops should be assisted to find accessible markets for their crops.

If the proposed large irrigation scheme within the Tana delta area is implemented, measures for environmental management should be taken into account.

4.4 LIVESTOCK AND RANGELANDS DEVELOPMENT

4.4.1 SPECIAL PROBLEMS AND OPPORTUNITIES OF DRYLANDS

More than 75% of Tana River District can be classified as rangeland. (See section 2.3.1 above). Between 3 to 5 percent of livestock in the district die every year due to drought. Water supply is therefore the most significant constraint to livestock development in the district. The harsh climatic conditions in the arid part of the district explain why the pastoralists are always moving in search of grass and water.

Although the dryland areas of Tana River District are only sparsely populated, there is lack of basic infrastructure which impedes development. Lack of infrastructure coupled with the mobility of pastoralists, limits the possibility of providing better extension services to these areas. Water availability affects the development of ranches because providing piped water to distances 20 kilometres or more away from the Tana River is very expensive. Ida-Sa-Godana is the only ranch with some water storage facilities. Most of the ranches have no water at all. Movement of livestock in search of grass especially during the dry seasons, causes overconcentration of animals in the southern locations of Garsen Division, and this leads to overgrazing.

Since almost all the land occupied by the pastoralists is stateland, establishment of a ranch is delayed because the Commissioner of Lands takes a long time to release letters of allotment. On the operating ranches, management problems are experienced because there is lack of qualified managers to run the ranches and keep proper records of accounts and bookkeeping.

Livestock diseases, such as Contagious Bovine Pleuropneumonia (CBPP) (which affects cattle), Contagious Caprine Pleuropneumonia (CCPP) (affects goats, and sheep), tick-borne diseases, east-coast fever, trypanosomiasis, foot and mouth disease blackquarter, anthrax, etc., affect the development of livestock.

4.4.2 RANCH DEVELOPMENT PROGRAMMES

Ranches are well presented in the district. According to the 1984/88 district development plan, those already operating are concentrated in Garsen Division. An area of 1,358,000 hectares has been set aside for the development of ranches. Most of the operating ranches in the district are private or company ranches. These include Giritu Ranch, Wachu Ranch (Company ranches), Hagganda Ranch and Kitangale Ranch (Private ranches) (Fig 14). The main objective of the Ministry of Agriculture and Livestock Development is to organise the pastoralists into groups and then settle them by allocating them with ranches.

Another programme which is underway is the intention to start grazing blocks similar to the ones in North-Eastern Province. At present, the mode of ranching in the district is mainly Co-operative, Company and Private. However, where claimants have particular land ownership, group ranches can be encouraged.

4.4.3 RECOMMENDATIONS

Production of livestock on rangelands in Tana River District can be intensified through programmes to provide extension services to ranches, development of water supplies, dip construction, programmes of diseases control, improved artificial insemination, herd and pasture management, improved veterinary services and provision of credit facilities to ranches.

Government agencies, such as the Tana and Athi Rivers Development Authority, concerned with the development of dry lands, should try to develop the basic infrastructure in these areas. Where possible, donors should be approached to provide finance for water development, to meet the needs of the inhabitants of the dry areas.

In addition to livestock development, the introduction of drought-resistant crops such as sorghum and millet in the dry land areas should be emphasized to ensure that an adequate supply of nutritionally balanced diet is available.

4.5

ENVIRONMENTAL EDUCATION

4.5.1 THE ROLE OF EDUCATION IN ENVIRONMENTAL MANAGEMENT

The world community has become increasingly aware of the variety and complexity of environmental issues currently facing them. The major problem arises from the fact that most people regard the natural components of the environment as inexhaustible or unalterable. They use the resources to supply their daily as well as commercial needs without anticipating any degradation. It is therefore necessary to change people's attitudes towards the environment if rational management is to be achieved.

Education can create positive attitudes towards environmental management. In order to be effective, environmental education should be carried out as a unified educational system including both the young and adults through formal education, out-of-school education and information. At present, environmental education in Kenya is not an obligatory, well-integrated and continuous programme.

4.5.2 THE SCHOOL CURRICULUM

As formal centres for transmission of knowledge and skills, schools constitute a vital agent in the process of sensitizing the public on environmental management. The recent changes in the curriculum for various levels of the educational system will enhance environmental awareness and management as discussed below.

a) Primary Education

The Ministry of Education, Science and Technology (MEST), through the Kenya Institute of Education (KIE), has embarked on the revision of the Primary Schools Curriculum. The revision is being undertaken by the Primary Education Project (PEP). PEP has emphasized environmental education throughout the curriculum by using the ecosystems approach at a simple level and introducing practical subjects.

In addition the project has produced materials for use in Primary Teachers Colleges for possible implementation in May 1985. This curriculum replaces one which did not focus on environmental education sufficiently to create the right attitude among teachers. Such teachers together with schools inspectors require inservice courses or seminars to keep them aware about new trends in environmental education. The Teachers Advisory Centres (TAC) should be increased and facilitated

to organise such courses. Currently, the TAC in Tana River District is not capable of handling the large number of teachers scattered around the district.

b) Post-Primary Education

Currently in these institutions, suitable curriculum units are included in subjects like Geography, Statistics, Agriculture, Sciences and Woodwork Technology. The main objective is to promote awareness of environmental problems and develop a concern for environmental quality.

The MEST has now embarked on the revision of the Curriculum - Secondary Education and Technical Education Projects (SEP and TEP). It is envisaged that more of the environmental education will be incorporated. The Project will also develop materials for Secondary Teachers Colleges.

Post-Primary education in Lower Tana River is available to a very small proportion of children in the age category (Section 2.5.4). The majority must be reached in a different way as explained below.

c) Adult Education

Most environmental problems are either traceable to actions by adults or affect them. Environmental adult education should therefore be seen as a tool to enable them understand the complex nature of their environment and solve their day to day problems.

Within their curriculum, functional literacy covers important subjects, e.g. community development projects, health-related topics, home science, agriculture and animal husbandry. The adult educators are encouraged to make learning more meaningful by inviting extension workers to participate in relevant sessions, but the level of adherence to this requirement varies from teacher to teacher. There is need for the local administration to be sufficiently involved in assisting to make the programme a success.

4.5.3 ADMINISTRATORS AND OTHER DECISION-MAKERS

Administrators and other decision-makers both in the public and private sector should be given correct information about methods of rational utilization of natural amenities in order to achieve proper environmental management. This can be done through:-

- lectures, journals, exhibitions and mass media
- special instructions in the existing system of general education through special courses e.g. at the Kenya Institute of Education, Matuga Development Centre, etc.
- Workshops organised at the district level on local environmental problems.

Although practice has shown that systematic education is more effective than propaganda, efforts should be made using both methods to stimulate concern for environmental problems and values in those responsible for policy and decision-making.

4.5.4 PUBLIC EDUCATION

Extension officers normally use available media of communication such as chiefs' baraza village health committees, etc, to educate the people. While their programmes are encouraging, movements within this area are hampered by transport problems.

Voluntary organisations working in the area should also endeavour to teach people about proper environmental management. These include the Child Welfare Society, Family Planning Association and Freedom from Hunger Committee.

Similary, co-operative societies within the district should organise people involved in farming, fishing and ranching and give them relevant education so that the development of their economic activities enhances environmental quality. This should also enable them to use the resources on a sustained yield basis rather than destroy it.

4.5.5 RECOMMENDATIONS

a) General Recommendations

The National Environment Secretariat (NES) in co-operation with the Ministry of Education, Science and Technology, should play an active role in ensuring the infusion of environmental education at all levels. Concerted efforts should aim at reinforcing attitudinal change towards environmental management.

Questions emphasizing environmental aspects should be included in all national examinations.

Noting that locally written books, pamphlets and other literature on current environmental issues are necessary, potential authors should be encouraged through payment of honoraria, etc.

NES should spearhead incorporation of environmental topics into calendars.

NES in conjunction with the Kenya Institute of Education (KIE) and the School Equipment Production Unit (SEPU) at Kenya Science Teachers College (KSTC) should produce an environmental kit.

NES should invite education officers and inspectors of schools to seminars on environment and development to inculcate in them a concern for proper environmental management.

Policy-makers should appreciate the importance of participation in environmental courses and seminars. On the same token, education officers from NES should attend all seminars organised on environmental aspects at district and local levels. Short seminars, of preferably one day duration, are ideal.

Inservice courses for the PEP, SEP and TEP curricula should be organised for practising teachers, college tutors and inspectors.

b) Specific recommendations on Lower Tana River

The local Teachers Advisory Centre (TAC) should incorporate environmental components in their activities in order to effectively assist primary school teachers. NES should provide necessary inputs, e.g. posters, booklets and pamphlets. The TAC should liaise with the District Education Officer on this and in future organize seminars involving relevant organizations, local authorities and teachers. NES should look into the possibility of organising a seminar at local or district level.

School clubs, e.g. wildlife clubs, young farmers, etc., play an important role in creating environmental awareness, and they should be encouraged. Schools which can establish environmental clubs should obtain guidelines from KTSC. The District Education Office should organize club competitions for the award of certificates preferably on World Environment Day. NES should look into the possibility of budgeting for the certificates.

The adult education section should be provided with services and facilities to assist environmental education and training. Such services should include visual aids and excursions for elders to environmentally degraded areas. Total mobilization of individuals or groups who can contribute to environmental education is absolutely essential.

Dissemination of proper environmental education to administrators is vital and formal inservice training should be encouraged in all Government Training Institutes.

Taking note of the vital role the public plays in environmental degradation, there is need to create awareness among them through mass media - radio, television, films, pamphlets, barazas, shows, etc. Use should be made of environmental slogans over the radio. Public officers in charge of information should help increase environmental awareness through one or two minutes of environmental slogans over radio before school broadcasts, news etc. Such slogans can also be printed on wrappers of popular or essential commodities, e.g. match boxes, salt, milk, etc.

Kiswahili pamphlets on environment should be prepared by NES and sent to the District. Kiswahili should also be used in disseminating research findings especially for materials destined for local libraries. These would help to keep adults literate.

NES should approach religious organisations, e.g. Young Muslims Association, NGOs like Family Planning Association of Kenya, and mass organisations, like Kenya National Union of Teachers, etc., to disseminate ideals of proper environmental management.

Extension workers should follow up public activities, e.g., seedlings planted to ensure they survive.

NES should provide a set of slides on the Tana River environment to the Local Teachers Advisory Centres to facilitate dissemination of environmental education.

Environmental awareness should be provided for managers and industrialists.

Inservice courses should be conducted for teachers to enhance their ability to teach environmental education using local materials. NES should provide an input during the short courses accorded to provincial Administration officials

4.6

INSTITUTIONAL DEVELOPMENT

4.6.1 CO-OPERATIVES

Lower Tana River (Garsen Division) has five registered primary cooperative societies and one has been proposed. Out of those five only three are active; one is dormant and the other one is registered but has not started operations. These societies comprise of one ranching, three multi, produce one fishing and the proposed Tarassa Fishermen's Co-operative Society which is intended to handle dried fish from the various ox-bow lakes and Tana River (Table 4.1). The small number of co-operatives with a total membership of less than 1,000 members does not warrant the formation of a Union and as such the societies are not affiliated.

The multiproduce societies were essentially formed to handle the marketing of mangoes, rice and green grams. South Tana Farmers' Co-operative is an experimental project of A.I.D.P. for marketing of rice and green grams. The society has not been able to buy rice since its inception due to a conflict in the price offered by the National Cereals and Produce Board (NCPB) and what the Agricultural Technical Advisors say it should be. While the NCPB is ready to buy a bag of rice at K.Shs. 201.00 the Technical Advisors' research show that the same bag could cost K.Shs. 250.00. The same conflict applies to green grams. The Board pays less than the local market.

The Chara Farmers Co-operative Society, handling mangoes, has not been able to market the crop effectively due to the problem of transport. The roads in the division are poor and become impassable during the rainy seasons. The crop is abundant and therefore has a small local market. An external market could ease the problem but the problem of transportation has to be sorted out first. At present, the society is dormant and is likely to stay so until it gets access to both internal and external markets.

The only ranching society is affected by inadequate water supply. Ranch animals share the little available water with wild animals. The wild animals, especially buffaloes, have ticks and are a threat to livestock on the ranch.

Kipini Fishermen's Society, which is registered in Tana River District but administered from Lamu District, is the most active society in the area. It is affiliated to the North Coast Fishermen's Co-operative Union.

TABLE 4.1

CO-OPERATIVES IN LOWER TANA RIVER

NAME	LOCATION	MEMBERSHIP	FUNCTION/ ACTIVITIES	STATUS
1. Ida-Sa-Godana Ranching Cooperative Society Limited	Bilisa & Ndera Location	100	Ranching	Active
2. South Tana Farmers' Cooperative Society, Limited	Ndera, Salama, Bilisa, Ngao & Chara Locations	450	Multiproduce marketing (rice & green grams)	Active
3. Chara Farmers' Cooperative Society, Limited	Ngao and Chara Locations	-	Multiproduce (Mangoes) marketing	Dormant
4. Kipini Fishermen's Cooperative Society, Limited	Chara Location (but administered from Lamu District)	77	Fishing	Active
5. Salama Consumers' Cooperative Society, Limited	Salama and Bilisa Locations	No members so far	-	Registered but not started operations
6. Tarassa Fishermen's Cooperative Society, Limited	Ngao and Chara Locations	150 have registered so far as members to be if the Society is registered	To deal with dried fish from Ox-bow lakes and Tana River.	Proposed

The Cooperative Movement has not gathered momentum due to some major problems. Although misallocation of funds is not common with the societies, the members lack cooperative knowledge. The district gets quotas for sending committee members to the Cooperative College in Nairobi every year, but this is sometimes not done. There were seven courses (in Management) planned for committee members and members within the division in the 1984/85 plan period.

There is a positive response towards cooperation in the division but the Ministry of Cooperative Development has not been very effective in its promotion, coordination and supervision. It has only one vehicle which is grounded and the Division is vast with few transport and accommodation facilities. As such, interaction between members of the societies and departmental staff is minimal.

4.6.2 SELF-HELP MOVEMENT

Self-help (Harambee projects) started in the Division in 1960. However, the self-help spirit has been a way of life with the people of Garsen Division since time immemorial. Every able-bodied person contributes to the welfare of the community at large. People organize themselves into various development groups and contribute funds, labour and materials to identified projects. The Government, through its annual allocation of funds, sometimes in collaboration with local and international voluntary organisations, provides technical and financial assistance during the implementation of such projects. When a project has been initiated and has taken off, the Social Development Officer approaches the District Development Committee which decides which project should be assisted.

Most of the development initiatives in Lower Tana River (Garsen Division) come from women and youth groups. Men are more involved in the provision of essential services like water and school buildings. There are 27 women's groups with a total membership of 365 members and an average of 35 members each (Table 4.2). There are also 6 rural youth groups with 128 members. Some of the groups are formed by the local people, others by the local leaders and others by the Department of Social Services and agricultural technical advisers.

All women's groups have handcrafts as the major activity. Other activities include vegetable growing (seasonal), goat and sheep keeping, cookery, sewing, rental houses and small business undertakings (Table 4.2). At present there are 6 completed rental houses and 4 community centres. In addition all women groups have come together and put up a hostel. There are 6 permanent school buildings and one hostel under construction all of which are the efforts of various women groups. Several temporary buildings, mostly schools, have been

TABLE 4.2 WOMEN GROUPS IN LOWER TANA RIVER

NAME OF GROUP	MEMBERSHIP	LOCATION	PROJECTS	EVALUATION OF SUCCESS	SOURCE OF FUNDS	REMARKS
1. Majaribio Women Group	286	Bilisa Location	Hostel	The hostel is almost complete	<ul style="list-style-type: none"> - Contributions (members) - D.D.C. - Social services - Women's Bureau 	This is a combined effort of all women groups in Garsen division though not all have joined the project.
2. Kitere Women Group	35	Ndera Location	Rental houses	Completed 1984	<ul style="list-style-type: none"> - Contributions (members) - Y.W.C.A. 	Given Technical and Financial assistance
3. Mnazini Women Group	30	Ndera Location	2 Rental Houses	1 completed 1 under construction	<ul style="list-style-type: none"> - Contributions - N.C.C.K. - Social Services 	Technical and material and finance given iron-sheets by N.C.C.K.
4. Sera Women Group	26	Salama Location	Community Centre	Under construction	<ul style="list-style-type: none"> - Contributions - Social services. 	Technical and Financial assistance given
5. Maziwa Women Group	30	Salama Location	<ul style="list-style-type: none"> - Community Centre - Home Industry (Tailoring) 	<ul style="list-style-type: none"> - Have 4 machines and making clothes 	<ul style="list-style-type: none"> - Contributions - Lutheran Church - Social Services 	<ul style="list-style-type: none"> - Members contributed materials (clothes) - The church donated the machines and labour. - The department of Social Services gave Finance, Cement, Iron sheets and timber.

Table 4.2 Cont..

NAME OF GROUP	MEMBERSHIP	LOCATION	PROJECTS	EVALUATION OF SUCCESS	SOURCE OF FUNDS	REMARKS
6. Kulesa Women Group	32	Salama Location	Community Centre (Tailoring)	2 machines	- Contributions - Lutheran church - Social Services	- The church donated the machines and labour - Social Services gave finance - Not operating effectively.
7. Wema Women Group	60	Salama Location	Community Centre (for meetings etc) Vegetables plot	- completed - Vegetable plot is very successful	- Contributions - Roman Catholic Church - Social services	- The church gave timber for roofing while Social Services assisted with materials & finance
8. Lazima Women Group	26	Salama Location	- Handcrafts	- New group - Has not started any project	-	The Social Services department is trying to encourage the group.
9. Sãiloni Women Group	22	Salama Location	- Handcrafts	- New group - Not started any projects	-	The Social Services Department is trying to encourage
10. Garsen Women Group	46	Bilisa Location	- Vegetable plot - Trees plot - Bought a plot for a Rental House	Doing well	- Social Services	- The Social Services Department has given materials and finance

Table 4.2 Cont..

NAME OF GROUP	MEMBERSHIP	LOCATION	PROJECT	EVALUATION OF SUCCESS	SOURCE OF FUNDS	REMARKS
11. Idsowe Women Group*	35	Ngao Location	- Bakery - Handcraft - Cultivation	Doing well	- Social Services Dept - Women's Bureau	Social Services gave material & the Women's Bureau finance
12. Shirikisho Women	15	"	- Goat keeping - Handcraft	"	- Social Services	- Finance & materials
13. Kibusu Women Group*	25	"	- Rental House - Kiosk	"	"	"
14. Dalu Women Group*	20	"	- Vegetable Growing - Handcraft - Rental house	"	"	"
15. Ngao Women Group	60	"	- Social Hall - Beer Store	"	"	"
16. Tarassa Women Group	48	"	- Rental House	"	"	"
17. Golbanti Women Group	35	"	- Handicraft - Rental House - Vegetable plot	"	"	"
18. Oda Women Group*	55	"	- Rental House - Poultry keeping - Vegetable plot	" "	" "	" "
19. Nduru Women Group	25	Chara Location	- Vegetable plot - 2 rental houses	"	"	"
20. Vumbwe Women Group*	-		-	Has not embarked on any project	-	

Table 4.2. Cont..

	NAME OF GROUP	MEMBERSHIP	LOCATION	PROJECTS	EVALUATION OF SUCCESS	SOURCE OF FUNDS	REMARKS
21.	Samikago Women Group	40	Chara location	-Vegetable plot - Handcraft	Doing well	Social Services Department	Aided by the Social Services with materials and finance.
22.	Shirikisho 2 Women Group	26	"	- Vegetable plot	New group	-	- Not aided
23.	Mazingara Women Group*	50	"	"	"	-	"
24.	Kipini Women Group	60	"	- Self-help maternity - Handcraft	Doing well	- Social Services- department	Aided with materials and finance
25.	Mkokoa Women Group	-	Bilisa location	-	Dormant	-	- Members of this group come from outside the District and have left.
26.	Mwina Women Group*	-	Salama location	- -	New group	-	Members to be attending meetings to learn about the benefits of women groups.
27.	Marembo Women Group*	-	"	-	"	-	"

* These groups have no Adult Literacy Classes and are Inactive.

SOURCES: District Cooperatives Officer, 1984

built on self-help basis by the women with the help of men. But the men have not organized themselves into a specific group. All the youth group activities are agriculturally oriented.

The groups raise funds through member contributions and sale of hand-crafts and agricultural produce. However, these funds are meagre and most of their support comes from the Department of Social Services in the form of technical and financial assistance. Other major donors include the Women's Bureau (Maendeleo ya Wanawake), C.A.R.E. (Kenya), and Y.W.C.A. The YWCA. has so far taken over the running of 8 women groups to which it gives financial aid, training, and is currently paying 4 adult literacy teachers. It also organizes tours for members of these groups to visit other groups outside the district.

People in Lower Tana River have shown positive response towards self-help movement but its effectiveness has been limited by a host of problems. Illiteracy level is still high, making it difficult to introduce changes to a community which is still very traditional. The various groups involved in agricultural activities and especially those away from the Tana River are greatly hit by drought. Wild animals are also a threat to the crops. The activities of the groups are homogeneous with the result that marketing of their products is difficult and tends to discourage the efforts of the groups. There is a great need to educate and encourage the various groups. Unfortunately, the area is vast with poor transport and communication facilities and a skeleton staff of the Social Services Department. Consequently, interaction between members of the groups and departmental staff is minimal.

4.6.2 DEVELOPMENT ADMINISTRATION

The development process is an interaction of two sets of activities: private initiatives to promote individual and group welfare, and Government programmes and resources applied in various sectors. Development administration is how these activities are organized, promoted, implemented and necessary research authorized. The recurrent problems of misallocation of funds, poor coordination, lack of manpower, and lack of incentives must be taken seriously if these activities are to succeed.

In Lower Tana River (Garsen Division) private initiatives are usually small self-help projects in agriculture, education and small business enterprises. Women are the champions of most harambee projects although men are also active in the provision of essential services like schools and water supply.

The region is almost all ranching area with few income-generating activities. Consequently, the people have limited or no funds to contribute to major development projects. Most of the major projects are Government projects. Even the small harambee projects rely heavily on Government grants and donations from private voluntary organizations. The Government has development priorities in the supply of water and increased agricultural production. Although there is plenty of water flowing along the Tana River, the water needs to be treated and piped, especially to those people living away from the river. The area has a potential for rice growing through irrigation which could increase food supplies for the area and incomes for the local community. Education, health, transport and communication and livestock development are also high in the list of Government development priorities in the region.

Misallocation of funds is not a common issue in development in Lower Tana River. Coordination of the various projects is made difficult by the poor transport and communication facilities. The harsh environmental conditions make some of the people semi-nomadic thus depriving the area of manpower for the projects. Various departments have inadequate field offices and means of transportation for supervision and promotion of the on-going projects, culminating in a delay in their implementation. And generally, the area lacks development incentives for the local people and Government officers.

4.6.3 RECOMMENDATIONS

In the absence of vehicles for the various ministries and departments the Government should provide motor-bikes which are cheaper to buy and maintain and best suited for the difficult terrain.

The Government should consider the provision of guest-houses in key centres to enable the field officers to travel extensively for supervision and coordination of various activities. There is a need for continued maintenance of the major road and rural access roads.

There is need to train the leaders of the women groups in various technologies so that the groups can diversify their activities.

5.0

LOWER TANA RIVER ENVIRONMENT

In Part I of this report we outlined the general overview of Lower Tana River; in Part II we described the main environmental trends in resources use and the related socio-economic factors. Some major environmental problems have been identified and a set of recommendations for dealing with them proposed at the end of each chapter. In this section, priority problems which need immediate attention are identified if development is to continue without undermining the natural and human resources on which it depends. The list is not exhaustive but it includes the following problems: agriculture and wildlife menace, livestock production and water supply, fisheries and conservation of indigenous vegetation.

All these problems have multiple causes and effects, and therefore they require co-ordinated action by the Government, non-governmental organizations and individuals if they are to be dealt with effectively.

5.1

AGRICULTURE

Agriculture in Lower Tana River is basically subsistence and not well-developed. Irrigation has increased rice production but there is room for further expansion. The problems which should be solved to allow for increased agricultural productivity include: wildlife menace, transport and organised markets.

5.2

LIVESTOCK PRODUCTION

Large areas of Lower Tana River are unsuitable for cultivation but could be developed for livestock production. This requires proper water supply, related services and organised marketing. With limited rainfall, and lack of water in many areas, overgrazing and environmental degradation are common phenomena in this area.

5.3

FISHERIES

The potential yields of both the freshwater fisheries and inshore marine fisheries should be determined to facilitate development of the fisheries. The evaluation should also propose regulatory measures to ensure the fisheries are exploited on a sustained yield basis.

5.4

CONSERVATION OF INDIGENOUS AREAS

In many areas vegetation cover has been removed to give way for agriculture and irrigation schemes and through overgrazing during the dry season when pastoralists from the north move southwards. Cultivation, and especially irrigation, has led to removal of vegetation along riverbanks leaving them unprotected from erosion. An effort should be made to retain some indigenous plants.

The Tana River delta is an important breeding area for waterbirds, and transformation of this area into an irrigation scheme will affect the birds. It is therefore essential to maintain the existing diversity of natural communities.

5.5

HEALTH

The Lower Tana River area is generally flat and prone to flooding during the wet season. Sections of it are being developed for irrigation. The use of agro-chemicals along the whole Tana River valley will accumulate and in the end affect aquatic and human life.

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